DETERMINANTS OF SMALL AND MEDIUM SIZED FAST GROWING ENTERPRISES IN CENTRAL AND EASTERN EUROPE: A PANEL DATA ANALYSIS

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Abstract

The purpose of this paper is to explore the main determinants of growth in small and medium sized enterprises (SMEs) in Central and Eastern Europe. The important role played by SMEs in the economic development of Central and Eastern European (CEE) countries has attracted the recent attention of academics and policymakers but remains relatively unexplored. Empirical research has suggested that firm growth is determined not only by the traditional characteristics of size and age but also by other firm-specific factors such as indebtedness, internal financing, future growth opportunities, process and product innovation, and organisational changes. Although growth in manufacturing and service SMEs in transition economies is well explained by the traditional firm characteristics of size and age, there is no empirical evidence concerning what other specific factors may be associated with SME growth and performance in these countries. Using a panel dataset of 560 fast growing small and medium enterprises from six transition economies we find that firm size when measured by firm total assets can explain to a large extent the growth in SMEs in these countries. When size is proxied by a firm's number of employees the observed effect is marginal. Firm specific characteristics such as leverage, current liquidity, future growth opportunities, internally generated funds, and factor productivity are found to be important factors in determining a firm's growth and performance. Age and ownership do not seem to be able to explain firm growth. The results of our empirical study have also some policy implications: we argue that governments in transition economies need to pay an increased attention to small and medium sized enterprises and try to create a business environment that will be beneficial for SME development.

Keywords: transition economy, small and medium enterprise, growth, panel data analysis

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1. Introduction

The rapid growth of global markets observed over the last decade has stimulated competition in both developed and developing countries, forcing entrepreneurs and policy makers to adopt market-oriented policies. The fact that the share of SMEs has increased in these countries suggests that efficient SMEs have actually been able to deploy new strategies in order to maintain, or even enhance, their competitiveness in a globalised economy.[1] SMEs account for over 95 per cent of enterprises and 60-70 per cent of employment, and generate a large share of new jobs in OECD economies. In the European Union, they account for over 99 per cent of all enterprises. Furthermore, 91 percent of these enterprises are micro-firms with fewer than 10 workers (OECD, 2009). Given their importance in all economies, the growth of SMEs is essential for economic recovery and development.

Many different theories have attempted to identify the main factors underlying firm growth. They can be divided into two main schools: the first addresses the influence of firm size and age on growth, while the second deals with the influence of variables such as strategy, organization and the characteristics of the firm's owners/managers. In fact, a huge number of studies have been devoted to examining the relationship between growth and the firm's size and age.[2] For example, Evans (1987) examined the effects of firm size and age on growth using data on manufacturing firms in the United States. Although several previous studies had supported Gibrat's law that hypothesizes that growth is independent of size, Evans (1987) found that firm growth decreases with firm size and age. However, the empirical literature has suggested that firm growth is determined not only by the traditional characteristics of size and age but also by other firm-specific characteristics. For example, Heshmati (2001) found that the degree of indebtedness positively affects sales growth using data on Swedish micro and small firms, while Becchetti & Trovato (2002) documented the effect of external finance on firm growth in the Italian manufacturing industry, apart from the traditional determinants of age and size. Elston (2002) provided evidence that cash flow has an impact on the growth of firms listed in the Neuer Market of Germany, even when controlling for firm size and age. In a recent study Morone & Testa (2008) using a sample of 2,600 Italian SMEs find that, on average, young firms are more likely to experience positive growth; moreover, turnover growth is positively associated with firms' size, process innovation, product innovation and organisational changes. In contrast, marketing innovation does not considerably affect Italian SME growth.

While a significant amount of research has been done on the determinants of growth in large firms, much less is known with respect to SMEs, especially manufacturing SMEs, given that

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[1] Many small and medium sized enterprises (SMEs) currently evolve in a complex business environment, characterized by globalization, the internationalization of markets, and the need for greater efficiency, effectiveness and competitiveness based on innovation and knowledge. This has put increasing pressure upon the management of these firms, especially the manufacturing SMEs that must now compete globally (Cagliano, & Spina, 2002).

[2] Firms with growth ambitions require capital to fuel their growth. Regardless of size or age, access to capital is a matter of paramount importance. According to Timmons (1994) small, young firms tend to draw capital from internal sources, personal sources, and informal investment. As firms grow, they face additional capital requirements and must turn to external sources such as banks and public debt and equity markets. This is consistent with Myers, & Majluf's (1984) assertion that SMEs have a 'pecking order' of preferred capital sources in which retained earnings will be the first source accessed, followed by bank debt, private external equity and then public debt or equity.

their growth and prosperity are usually more often and potentially subjected to different constraints and contingencies related to their specificity as business organizations (Raymond, Bergeron & Blili, 2005). The specific characteristics that fundamentally distinguish SMEs from large enterprises relate to their environment, structure, strategy and decision making process, but also relate to their flexibility, proximity to markets, and quickness to react and reorient themselves.[3] Some recent studies (see Markovics, 2005 and Lesáková, 2009) emphasize also the role of innovations as a factor of the increased competitiveness of small and medium enterprises in transition economies on the European market

The purpose of this paper is to analyze the main variables that allow us to explain the performance of fast growing SMEs in transition economies. Theoretically, we explain such growth through a combination of traditional (age and size) and firm specific (internal finance, capital structure, growth opportunities, liquidity and factor productivity) characteristics. Empirically, this paper is different to previous literature in two respects: (1) the primary goal of our study is not to provide an outright explanation of firm growth; rather, we aim to establish what internal characteristics determine the performance of fast growing SMEs in different CEE countries. This aspect determines the methodology used (fixed effects specification that allows growth to vary between sample countries, while the determinants of firm growth should have a similar effect on all economies); and (2) a firm is classified as a fast growing business entity if growth in its sales or assets is between 10 and 50 per cent on average for five subsequent years. Using a panel data set of 560 such firms in Central and Eastern Europe, we find that firm growth is related not only to the traditional determinants of age and size but also to other specific characteristics associated with financial structure and productivity. In line with previous research, we find evidence that firm size when proxied by its total assets tends to increase sales revenues. Another finding is that SMEs in transition economies rely heavily on internally generated funds to support their assets growth but need access to external capital to support their growth in sales. This result supports the notion that firms with large cash flows will grow faster.

These results come with some limitations. Firstly, we do not use a control group (e.g., slower growing or not growing firms) as a basis for comparison. Thus, we cannot say explicitly whether the firm-specific characteristics that we find to explain SME growth are specific determinants of faster-growing SMEs only as opposed to the slower-growing ones, or whether it is about differences between the countries in the region and other countries that have been studied in previous research. This may lead to a selection bias problem which could require further econometric analysis. To deal with this problem we run the model specifications both for the entire sample and excluding our six countries one by one from the data set; in both cases we got very similar results. Secondly, we do not include younger firms (SMEs of less than five years of existence) in our data set in order to investigate the effect of growth determinants on both younger and older firms. As a result, age seems not to be able to explain firm growth.

The rest of the paper is organized as follows: the next section outlines our conceptual framework and summarises the findings of the research literature on the determinants of SME

[3] Wiboonchutikula (2002) finds that in normal times not all small- and medium-sized firms in Thailand are capable of generating more employment than large firms. Rather, it depends on the production techniques firms use. For labor-intensive export-oriented industries, firms will be able to generate high employment regardless of size. For capital-intensive industries, most small firms are less productive than large firms, and their expansion will not be able to generate high employment despite the large number of small firms.

growth. The econometric model and the data panel analysis are presented in section 3. Section 4 discusses the econometric results from the panel regressions. Some concluding remarks are offered in the final section.

2. Literature review

Small and medium sized enterprises (SMEs) have been of increasing interest for academics and policy makers in recent years since their role in both developed and developing economies has been established as being major. According to the European Union definition[4], small enterprises are those who have fewer than fifty employees and an annual turnover of less than 10,000,000 EUR. Medium enterprises are defined as ones having fewer than 250 employees and a turnover of less than 50,000,000 EUR. By annual turnover the European Commission (EC) means income from sales and services without VAT and other indirect taxes. SMEs contribute significantly to the economic growth of both developed and developing countries and insight into how they prosper is worthy of investigation. Small and medium firms have been the primary source of employment creation worldwide over the last two decades.[5] At the same time access to financing continues to be one of the most significant challenges for the creation, survival and growth of SMEs, especially innovative ones. Thus, increased attention has been paid to the key factors determining SME growth and success.

In the conventional framework of firm growth analysis, financing of growth is investigated through the growth-size-profitability relationships. A considerable body of literature deals with this question, analysing the relationship between the growth and the financial structure of the firm. If all firms had equal access to capital markets, external funds would provide a perfect substitute for internal capital, which implies that a firm's financial structure is irrelevant to investment and growth. It is often argued, however, that firms face difficulties in financing from external sources due to asymmetric information problems in capital markets. In fact, a number of studies on capital market imperfections have examined the impact of financial constraints on investment decisions and firm growth. For example, Fazzari *et al.* (1988) argue that financial constraints in capital markets affect investment, and emphasized that the link between financial constraints and investment varies by type of firm. Audretsch & Elston (2002) assert that financial constraints may be more binding as firm size decreases.[6]

In a more recent study, Wagenvoort (2003) uses financial data for more than 200,000 European manufacturing and construction firms, and finds that European SMEs suffer from a structural finance problem that hinders their growth. In particular, it is observed that financial constraints tend to hamper the growth of small and very small firms and to be less binding for medium sized enterprises. If compared with large enterprises, SMEs are more constrained by the availability of internal finance. Other empirical studies (e.g., Becchetti & Trovato, 2002; Carpenter & Petersen, 2002) have confirmed that the constrained availability of finance affect

[4] See EU Commission Recommendation published in in 2003 (OJ L 124 – 25 May 2003).

[5] According to data collected by Ayyagari, Beck, & Demirgüç-Kunt (2007) for 76 developed and developing countries, SMEs, on average, account for over 60% of manufacturing employment.

[6] Beck, Demirgüç-Kunt, & Maksimovic (2005) investigate a rich set of obstacles reported by small, medium and large firms and directly test whether any of these reported obstacles are significantly correlated with firm growth rates. The results indicate that the extent to which financial and legal underdevelopment and corruption constrain a firm's growth depends very much on a firm's size. It is the smallest firms that are consistently the most adversely affected by all obstacles. Financial and institutional development weakens the constraining effects of financial, legal, and corruption obstacles and it is again the small firms that benefit the most.

small firm growth. Even though smaller firms seek to achieve minimum efficient scale, they are more likely to be unable to obtain sufficient capital from external sources in order to expand their businesses. In particular, under the present dismal economic conditions, internal finance may have a greater impact on the growth of SMEs. Moreover, the intensive use of internal finance minimizes growth costs since internal resources cost less than external resources. This is due to the fact that access to financial markets and provision of external resources are more problematic for small firms (Sarno, 2008).[7]

It is often argued that SMEs are, in contrast to large firms, informationally more opaque, have on average higher growth rates, are financially more constrained, and are more dependent on bank loans when outside financing is needed. For a bank, the limited information available about the SME increases the risk associated with providing financing, which induces the bank to reduce loan maturity and increase the interest rate. To optimize loan conditions, SMEs have an incentive to build a relationship with their bank(s) in order to minimize the information asymmetry. The association between bank debt maturity and relationship lending is widely investigated (see Ortiz-Molina & Penas, 2004 for US firms and Hernández-Cánovas & Koëter-Kant, 2008 for EU firms). For example, Hernández-Cánovas & Koëter-Kant (2008) find that, after controlling for firm-specific characteristics such as size, age, debt and financial situation, close firm-bank relationships increase the likelihood of obtaining longer-term bank loans. However, once they allow cross-country heterogeneity to influence the results, the empirical evidence shows that relationship lending and its effect on bank loan maturity for European SMEs is impacted by country-specific factors. On the basis of similar arguments, Ozkan & Ozkan (2004) argue that building relationships with financial institutions will improve firms' ability to access external financing. This suggests that firms with a higher proportion of bank debt will be able to access external financing more easily. However, SMEs find it very difficult to obtain external finance. In this case, maintaining bank relationships helps them improve the availability of funds, since they suffer less credit rationing in the bank credit market.[8]

The research on firm growth finds that high growth tends to be associated with a firm's entrepreneurial behavior. Thus, growth tends to be considered a logical consequence of innovative, proactive and risk-taking behavior on the part of the firm, as these are the dimensions which define an entrepreneurial orientation (EO). The relationship between the EO of the firm and its performance has been thoroughly investigated from both a conceptual (see Lumpkin & Dess, 1996) and an empirical point of view (Lumpkin & Dess, 2001; Wiklund & Shepherd, 2005).[9] A recent study by Wiklund, Patzel & Shepherd (2009) claims that an entrepreneurial orientation in a company is essential for flexibility and quick decision making in a small company. They believe that the general tendency in today's business

[7] The empirical research dealing with SME growth and its financing finds that growth processes are significantly affected by the availability of a cash flow to finance them. As Sarno (2008) shows in his study on southern Italian SMEs, the reasons for the considerable sensitivity of growth to cash flow lie not only in the conditions of particular opacity in the firm's relationship with financial markets but also in property dilution effects which discourage financing through the issue of equity.

[8] Berger, Rosen, & Udell (2007) argue that relationship lending is not the only way in which banks can extend financing to these firms. Different transactional technologies that facilitate arms-length lending (such as credit scoring and significantly standardized risk-rating tools and processes, as well as special products such as asset-based lending, factoring, fixed-asset lending, and leasing) are increasingly applied to SME financing.

[9] Several researchers have agreed that EO is a relevant conceptualization of entrepreneurship in existing firms. EO refers to a firm's strategic orientation, capturing specific entrepreneurial aspects of decision-making styles, methods, and practices. As such, it reflects how a firm operates rather than what it does (Lumpkin, & Dess, 1996).

environment is the shortening of product and business model life cycles. Consequently, the future profit streams from existing operations are uncertain and businesses need constantly to seek out new opportunities. Therefore, they may benefit from adopting an 'entrepreneurial strategic orientation'.

Moreno & Casillas (2008) find that EO and growth are positively related, although their relationship is more complex. They assert that the propensity for innovation is the dimension of EO that exercises the greatest influence on the type of expansion strategy used by the firm, encouraging the development of new products-technologies relationship through a strategic behaviour; these strategic behaviors are the principal driving force behind growth. Along with them, the conditions of the environment (highly dynamic and not very hostile) and the availability of resources favor the rapid growth of the firm. Freel & Robson (2004) employ a large-sample of SMEs located in Scotland and in Northern England, and find a positive relationship between novel product innovation and growth in employment and, for manufacturing firms, at least in the short term, a negative relationship between product innovation (both incremental and novel) and growth in sales or productivity. By contrast, growing sales and productivity appear positively associated with incremental process introductions in service firms.

A large group of studies has focused on the main determinants of SMEs' capital structure and the extent to which variations in capital structure between industries are due to industry effects or variations in the determinants of capital structure from industry to industry (see Hall, Hutchinson & Michaelas, 2000 for UK, and Sogorb-Mira, 2005 for Spain). Thornhill, Gellatly & Riding (2004) find a strong correlation between capital structure and knowledge intensity. In contrast, growth histories are not obvious determinants of financial structure. Results also suggest that leverage strategies are more apparent in low-knowledge industries, in firms with higher expectations of future performance, and in businesses with more balanced financial structures. More recent empirical studies (see Ozkan & Ozkan, 2004 for UK, and Garcıa-Teruel & Martınez-Solano, 2008 for Spain), test the determinants of firms' cash levels and find that smaller firms with more investment opportunities and risky activities possess a larger proportion of liquid financial assets.[10]

Some empirical studies associate SME growth with the personal characteristics of their owners and the environment in which they operate.[11] For example, an early study of Miller (1988) focuses on the effect of the environment in which a company operates on its strategy. He affirms that different external environments require different strategies matched with complementary internal environments and structures in order to promote success. For example, the strategy of innovative differentiation is most likely to be pursued in uncertain environments and correlates with the use of technocrats and liaison devices. The strategy of cost leadership is associated with stable and predictable environments and is correlated with

[10] Garcıa-Teruel, & Martınez-Solano (2008) find that firms usually pursue a target level for their cash holdings and their decisions are taken with the aim of achieving this. In addition, the evidence shows that the speed with which Spanish SMEs attempt to adjust their cash levels to the optimal level is higher than that found in previous studies for large firms. This can be explained by the fact that SMEs suffer more information asymmetries and more agency conflict arising from debt than larger companies, and therefore may indicate that the cost of being far from the optimal level is higher for them.

[11] To address this issue, Pelham, & Wilson (1996) among others, suggest that it may be advantageous to describe the environment of small businesses by a number of dimensions reflecting subjective perceptions of small business owners. These dimensions of the small firm's task environment have been investigated including the environment's munificence, turbulence, heterogeneity, hostility, dynamics, customer structure, and competition.

the use of control. The right choice of both strategy and the environment in which to implement it predetermines firm growth. A study by Reuber & Fischer (1997) examines the effects of the management team's international experience on the international growth of an SME. They find that it is not for how long a firm has been selling in foreign markets, but rather, for how long the firm delayed before selling in foreign markets. SMEs that are managed by internationally experienced teams are likely to delay less. Experience with and knowledge of foreign markets make it more likely that decision makers will consider mechanisms to sell outside the domestic market early on and less likely that they will set up routines based on a purely domestic perspective[12].

Two main conclusions for the choice of explanatory variables to be used in the empirical analysis emerge from the preceding discussion. First, in order to better understand the determinants of SMEs' growth in transition economies, it is crucial to specify an empirical model that allows for a combination of traditional firm characteristics (such as size and age) and more specific determining factors (e.g., total assets, leverage, internally generated funds, future growth opportunities, and factor productivity). All of these variables are closely related to the theoretical models that explain growth in SMEs. Second, CEE countries are far from being homogeneous and both the level of development and growth of SMEs change from country to country. Hence, another key question searches for common determining factors that can explain SMEs' growth and performance in this group of countries as a whole. In order to address these questions we develop a set of hypotheses and employ both the generalized method of moments (GMM) and the fixed effects specifications to test them.

3. Empirical analysis and results

This study aims to fill in the gap in the current debate on the determinants of growth in SMEs in Central and Eastern Europe. Our analysis is based on cross-sectional, panel data analysis of a set of small and medium-sized enterprises from six transition economies (Bulgaria, Croatia, Czech Republic, Poland, Romania and Serbia). In this paper we explore whether and to what extent the main finding of the research literature - that growth in SMEs can be explained by both traditional and firm-specific characteristics – holds also for transition economies. To answer this question we develop two research hypotheses:

Hypothesis 1: In line with previous research, we argue that growth in manufacturing and services SMEs in transition economies is strongly associated with the traditional firm characteristics of size and age.

Hypothesis 2: A number of other firm-specific characteristics related to SMEs in transition economies such as leverage, capital structure, internal finance and production efficiency should also play a major role in explaining the growth in these firms.

[12] Some quite specific characteristics associated with SME growth have also been investigated. For example, Kotey, & Folker (2007) examine the main and interaction effects of size and firm type on a variety of informal and formal training programs in Australian SMEs. Raymond, Bergeron, & Blili (2005) affirm that, to the extent that e-business is assimilated by the SME, it can significantly affect the firm's key business processes and relationships such as servicing customers and collaborating with business partners.

3.1 Data set

In this research we have adopted the European Commission's SME definition. The sample of SMEs considered in our study has been extracted from AMADEUS database[13] and includes 5,000 companies from six Central and Eastern European (CEE) countries.[14] Specifically, we have selected companies that meet the following criteria: (i) an annual growth rate in revenues (or assets) of at least 10 per cent averaged over the sample period (2001 – 2005); (ii) number of employees not less than 10, that is, micro enterprises are excluded from the sample; (iii) at least 5 years of existence as a business entity, (iv) positive net worth and/or positive net income in at least 3 years of the observation period; and (v) not included in a bankruptcy process. The information obtained was carefully screened, refined and cases with errors in the accounting data or missing values for some of the variables over the sample period were eliminated. Thus, the dataset has been restricted to the observations that embody all the essential variables available, and to those variables that have a complete record over the period of examination. As a result, the definitive number of firms that makes up our sample amounts to 560 for which we have full accounting data over the period 2001 – 2005, resulting in 2,800 observations of balanced panel data.

Geographical distribution of sample firms by age, size and sector is shown in Table 1. The data show that 11.3 per cent of all firms in the sample are small enterprises and 88.8 per cent are medium enterprises. The largest share of small enterprises is observed in Croatia (39 out of 63), while medium sized firms prevail in the Czech Republic (337 out of 497). With regard to the age structure of our sample, we observe that nearly 15 per cent of all SMEs are younger enterprises (with 5 to 10 years of existence), while 10.7 per cent can be classified as older firms (with more than 20 years of existence). The average number of years of existence for the whole sample is 16. It is worth noting that the selected firms are representative of SMEs from different transition economies and their economic sectors. As can be observed, manufacturing, wholesale and retail trade, and construction prevail over other industries (40.5 per cent, 21.6 per cent and 9.6 per cent, respectively), whereas companies from services sector such as financial intermediation and hotels and restaurants, account for less than 1 per cent of the whole sample of small and medium firms. If we refer to the geographical location of the selected firms that match the criteria listed above, the data in Table 1 show that 63.8 per cent of all firms are located in Czech Republic, followed by Croatia (26.6 per cent) and Bulgaria (4.5 per cent), and only 0.5 per cent in Serbia.

[Insert Table 1 Here]

Dependent variable

There is little agreement in the existing literature on how to measure growth, and scholars have used a variety of different measures. These measures include, for example, growth of sales, employees, assets, profit, equity, and others (see Davidsson & Wiklund, 2000). Moreover, the time span over which growth is analyzed in the literature varies considerably,

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[13] For more details see http://www.bvdep.com/en/AMADEUS.html. The AMADEUS database allows us to choose among a huge variety of public and private companies in 43 European countries. For the scope of our research we selected only small and medium sized companies.

[14] The original number of CEE countries included in the sample was 13: Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Czech Republic (CZ), Hungary (HU), Macedonia (FYROM) (MK), Montenegro (ME), Poland (PL), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), and Ukraine (UA). In order to obtain non-spurious regression results we applied some filters to the data to remove companies with missing observations or lack of full data record; thus our sample was limited to companies from only six CEE countries.

ranging from one to several years. Also, growth has been measured in absolute or relative terms. Perhaps the most common means of operationalizing firm growth is through relatively objective and measurable characteristics – such as growth in sales turnover, total assets and employment growth. These measures are relatively uncontroversial (methodologically) and data tend to be easily available, increasing the scope for cross-study comparability (Freel & Robson, 2004). In this study we use three growth models to examine more accurately the effect of the explanatory variables on a firm's growth and performance – growth in sales revenues, employment and total assets.[15]

Explanatory variables

In this study we have selected several variables that the empirical literature (see Honjo & Haranda, 2006; Wiboonchutikula, 2002; Wiklund, Patzelt & Shepherd, 2009; Sogorb-Mira, 2005; Hall, Hutchinson & Michaelas, 2000 and 2006; Garcıa-Teruel & Martınez-Solano, 2008) suggests are important growth determinants. Table 2 shows summarized description of the dependant and explanatory variables used in the empirical analysis and their expected impact on firm growth.

As explained in Section 2 a number of firm specific characteristics such as internal finance, capital structure, leverage, production efficiency, future growth opportunities, age and size, may help explain the growth in small and medium sized enterprises. Our approach in this paper is to relate firm growth not only with the traditional determinants of *age and size* but also to other specific determinants associated with a firm's financial, organizational and managerial characteristics. As already discussed, it is difficult for SMEs to access capital markets, and financial constraints are more binding for SMEs. Therefore, *internal finance* plays an important role in achieving the growth of SMEs by overcoming financial constraints. In order to capture the influence of internally generated capital on firm growth a variable (CASH FLOW) is constructed. According to hierarchy theory (Myers & Majluf, 1984) firms prefer to fund themselves with resources generated internally before resorting to the market. In these circumstances, firms with large cash flows will grow faster, and thus a positive correlation between cash flow and firm growth is expected.

[Insert Table 2 Here]

In addition, capital structure is different among SMEs, and *leverage* may be related to firm growth. In fact, Leung & Yu (1996) found that there is a negative relationship between growth and leverage. In our study the variable that proxies for a firm's capital structure (LEVERAGE) is taken as the ratio of total debt to total assets and the expected relation to growth is positive. Since small firms usually have a higher proportion of current liabilities in their capital structure than large firms, a firm's capability to sustain short-term *liquidity* is another relevant determinant of its growth. In order to capture this relation a variable (CUR_RATIO) is constructed by taking the ratio of current assets to current liabilities. It might be expected that firms that are able to maintain higher liquidity levels will face less

[15] Storey (1994) posits three overlapping subsets of variables which he concludes to show 'consistent' evidence of an influence upon firm growth – broadly, characteristics of the entrepreneur, of the firm and of the firm's strategy. Unfortunately, the database used in this study provides no data on characteristics of the entrepreneur. As a result, the influence of factors such as educational background or entrepreneurial experience cannot be controlled for. In addition, certain 'characteristics of the firm', such as legal status are also beyond the scope of the data available.

severe financing constraints. So, we expect current liquidity to be positively associated with growth.

Following Hall, Hutchinson & Michaelas (2006) a variable that captures the effect of future *growth opportunities* (INT_ASSETS) is constructed by taking the ratio of intangible assets to total assets. Intangible assets include research and development expenditure, trademarks, patents and copyrights. As these are investments with long-term payoffs one may expect that the greater the share of intangible assets in a firm's total assets, the smaller the growth in its operating revenues. So, the expected relation between these two variables should be negative. Two well known determinants – the absolute value of *total assets* (TOT_ASSETS) and *number of employees* (EMPLOYE) – are included as *size* variables in order to test for scale effects in the relation to growth and firm size. The empirical evidence shows that the larger the firm (in terms of assets or number of employees) the greater its potential to grow (Wiklund & Shepherd, 2005). Thus, we expect the firm's size to be positively correlated with its performance. Following Wiboonchutikula (2002) we estimate SME growth using different *productivity factors* as incremental explanatory variables - capital productivity (output/capital) and labor productivity (output/labor).[16] These two variables (CAP_PRODUCT and LAB_PRODUCT) not only present the basic operational structure of a firm but also allow us to examine the association between the efficiency of a firm's operations and its growth potential. In both cases we expect a positive relation between a firm's production efficiency and its performance.

Businesses of different sizes and ages may exhibit different organizational and environmental characteristics, which in turn may influence performance. The same is true for firms in different industries. Therefore, additional firm-specific characteristics are included as explanatory variables in our analysis to capture these effects. A dummy variable (OWNER) to proxy for the *ownership* (that is, public-traded vs. privately held) allows us examine the effect of ownership on SME's performance. It is argued that publicl-traded firms tend to access external funds more easily than privately-held firms. Therefore, firm growth may be different between private and public firms. *Age* is defined as the number of years a firm has been operating in the market (since the date of incorporation) and is expected to have a negative relation with firm growth. Thus, we suggest that younger firms are more likely to grow faster than older ones. Finally, in order to represent the *business environment* in which a firm operates – manufacturing or services sector in our case - a dummy variable (SECTOR) that takes on value of 1 for firms from services sector or 0 otherwise is used. We expect firms operating in services sector to have larger growth potential than those in the manufacturing sector.

The correlation matrix of dependent and explanatory variables is presented in Table 3 and is used to examine the possible degree of collinearity among variables. The table shows that the two most highly correlated variables are operating revenues and labor productivity (a coefficient of 0.7328). As we observe in Table 3, the correlation coefficients are not large enough to cause collinearity problems in the regressions and are statistically significant at the usual levels of significance. To mitigate the problem with possible multicollinearity we gradually exclude the variables that are expected to be highly correlated with the rest (in this

[16] Wiboonchutikula (2002) explains the difference in growth in SMEs with their different operating structures. The results show that the faster growing companies are less capital intensive and their labor productivity is higher compared to slow growing SMEs. These qualities give them the flexibility that is crucial to SME development.

case, TOT_ASSETS and LAB_PROD). Table 4 presents summary statistics for the whole sample of 560 firms. We can see that the sample is made up of small and medium firms with average assets of €7.97 million and average sales revenues of €9.61 million. They exhibit a low degree of leverage, with a debt of 0.19 times their total assets. Short-term liquidity as proxied by the current ratio (a median of 1.41) is relatively high and shows that the average firm in our sample has no problem with meeting its current obligations. In addition, the firm operating efficiency, as measured by capital productivity ratio, is relatively high (€1 invested in tangible assets generates €9.21 in sales revenues on average). Labor productivity in fast growing SMEs is also high (a median of 43.31). At the same time the future growth opportunities (as measured by the share of intangible assets in total assets) associated with these firms are relatively low (a median of 0.0011). The reason may be that small and medium firms invest fewer funds in R&D, patents and copyrights than large firms. The statistics for internally generated capital by the firms in our sample shows that €1 invested in total assets generates only €0.4632 in free cash flow on average.

[Insert Table 3 Here]
[Insert Table 4 Here]

3.2 Econometric model and empirical results

The structure of our dataset allows us to use a panel data methodology for our empirical research.[17] This type of analysis can control firm heterogeneity, and reduce collinearity among the variables that are contemplated (Arellano & Bover, 1990). Likewise, this technique enables us to eliminate the potential biases in the resulting estimates due to correlation between unobservable individual effects and the explanatory variables included in the model. Our panel data model may be represented as follows:

$$Growth_{it} = \alpha_0 + \beta_1(Tot\_Assets_{it}) + \beta_2(Lever_{it}) + \beta_3(Cur\_Ratio_{it}) + \beta_4(Inta\_Assets_{it}) + \beta_5(Cap\_Prod_{it}) + \beta_6(Lab\_Prod_{it}) + \beta_7(CF\_Ratio_{it}) + \beta_8(Employe_{it}) + \beta_9(Age_{it}) + \beta_{10}(Dummy_i) + \varepsilon_{it} \quad (1)$$

where $Growth_{it}$ is defined as the difference between the logarithms of a firm's sales revenues in periods *t* and *t-1* (see Honjo & Haranda, 2006). The other two measures of growth used in the regression model (1) are the percentage change in total assets and in number of employees. Variables Tot_Assets_{it}, CF_Ratio_{it} and $Employe_{it}$ represent firm *i*'s size, cash flow (normalized by total assets) and number of employees in period *t*, respectively. Variables $Lever_{it}$, Cur_Ratio_{it}, $Inta\_Assets_{it}$, Cap_Prod_{it} and Lab_Prod_{it}, represent capital structure, short-term liquidity, future growth opportunities, and capital and labor productivity of firm *i* in period *t*, respectively. Variable Age_{it} is the logarithm of the number of years of existence of firm *i* in period *t*. Variables for ownership and sector are proxied by dummy variables that take on a value of 1 if the stated condition holds or 0 otherwise. We estimate the parameters in equation (1) using the fixed effects estimator. To test the hypothesis regarding the absence of correlation between the unobservable country-specific effects and the explanatory variables,

[17] Panel data methodology is useful in that it allows us to relax and test assumptions that are implicit in cross-sectional analyses. In particular, we might mention two relevant aspects. Firstly, it is possible to control for unobservable heterogeneity, since the methodology provides us with more than one cross section. This allows us to eliminate biases deriving from the existence of individual effects. Secondly, the panel data methodology also makes it possible to model dynamic responses with micro data.

and thereby, to consider the individual effects as random or fixed[18], we use Hausman's (1978) specification test. Its outcome enables us to reject the hypothesis regarding the absence of correlation between the unobservable effects and the explanatory variables and, thereby, we consider the individual effects as fixed.

In addition to the fixed and random effects models we employ identical specifications using the generalized method of moments (GMM), proposed by Arellano and Bond (1991). The results for panel regressions are presented in Tables 5 through 8. We run the benchmark model (1) for six different specifications (see Table 5). Both TOT_ASSETS and EMPLOYE variables are used as proxy for firm size; thus, a collinearity problem may occur between these two, although the correlation coefficient is low and statistically insignificant at the usual levels (see Table 3). A variable that is highly correlated with the rest of the explanatory variables is LAB_PROD. To mitigate the problem with possible multicollinearity each of these variables is dropped from the rest of our model specifications. The explanatory power of model (1) is very high (the within R^2 is between 40 and 62 per cent for all model specifications) taking into account the fact that we use panel data. The results in Table 5 show that, in line with previous empirical studies, the impact of firm size as measured by the absolute value of total assets (TOT_ASSETS) on growth is positive and statistically significant at 1 per cent, for all model specifications. We also support the Wiklund & Shepherd (2005) finding that firm size as proxied by the number of employees (EMPLOYE) has also a strong explanatory power (see Models 1, 3 and 5).

As expected, the estimated coefficient of liquidity variable (CUR_RATIO) is positive and statistically significant at 1 per cent level of significance. Thus, our hypothesis that there exists a strong, positive relation between short-term liquidity and a firm's growth is confirmed at that stage of the analysis. In line with Honjo & Haranda (2006) we find that the degree of leverage (LEVER) a firm uses has a strong, positive impact on its growth in sales revenues. When the size variable (TOT_ASSETS) is dropped from our model the effect of firm's capital structure (as measured by debt to total assets ratio) turns out to be insignificant (see Model 3). In general, our finding suggests that SMEs in transition economies rely on internal financing sources for sales growth but need access to external capital to support their assets growth (see Table 6). The empirical results in Table 5 show that the estimated coefficients of the growth opportunities variable (INTA_ASSETS) are negative and strongly significant at 1 per cent, for all model specifications. This finding confirms our hypothesis that the expected impact of future growth opportunities on a firm' current growth is negative as these are investments with long-term payoffs.

The two variables (CAP_PROD and LAB_PROD) that proxy for a firm's production efficiency show a strong explanatory power in all model specifications. As we expected, the relation between labor productivity (output/labor) and growth is strongly positive and significant at 1 per cent (see Models 1 and 3). We have to read this result with caution as the LAB_PROD variable is significantly correlated with both sales revenues and capital productivity variables (see Table 3). In relation to a firm's capability to generate internal capital Audretsch & Elston (2002) finds that small and medium sized firms appear to be more

[18] The country-specific effects may be either fixed parameters that can be estimated ("fixed effects") or random disturbances characterizing the *i*th country ("random effects"). In the first case, the intercept is allowed to vary between countries but does not vary over time while the slope coefficients are assumed to be constant across countries. Such a fixed effects specification allows growth to vary between sample countries, while the determinants of firm growth should have a similar effect on all economies.

financially constrained using data on German firms, while Honjo & Haranda (2006) find no such evidence using a sample of Japanese firms.[19] In our study we find evidence for a strong, positive relation between a firm's cash flow and its sales growth, for all model specifications. This result provides further evidence in support of the hypothesis that internal finance has strong influence on sales growth, particularly of younger SMEs, that are more financially constrained. If it is true, more funds and support are required for the growth of younger firms (Honjo & Haranda, 2006).

When both TOT_ASSETS and LEVER variables are dropped from model (1) the data in Table 5 show that the rest of the explanatory variables are statistically significant at 1 per cent and with the expected signs, except the EMPLOYE variable (see Model 6). The two dummies used as proxies for ownership and the sector a firm operates in drop from all the fixed effect specifications but seem to be statistically insignificant in other (random effects) specifications. Also, we do not find evidence in support of the hypothesis that growth in manufacturing and service SMEs in transition economies is strongly associated with the traditional firm characteristic of age.

[Insert Table 5 Here]
[Insert Table 6 Here]

To account for unobservable country-specific effects in our model we run also random effects specification (see Models 4a and 6a). The random effects specification would allow us to estimate the impact of time-invariant variables on growth and actually provide more efficient estimates if the country-specific effects are not correlated with the other explanatory variables. The Hausman test shows that we have to reject the random effects specifications (*p*-value is less than 0.05 in both cases). Thereby, we consider the individual effects as fixed. In order to check the model variables for stationary we use Fisher test for panel unit root based on an augmented Dickey-Fuller test. The goal is to show that the variables in the model we use are time invariant, i.e. there is no dependence of their values on the time trend. The *P*-values of the Fisher tests show that all the variables are independent of time and we can conclude that the panel data is stationary.

Next, we run our model specifications using growth in firm's total assets as dependant variable and sales revenues as explanatory variable.[20] The results are shown in Table 6. Whereas it is not found that size variable (EMPLOYE) is significantly related to firm growth, it is obvious that a firm capacity to generate capital internally (as measured by its cash flow ratio) plays an important role in explaining the growth in its assets; the estimated coefficients of CF_RATIO variable are negative and strongly significant at 1 per cent, for all model specifications. This result is, at least, to some extent, supported by the fact that the relation between a firm's growth in assets and the degree of leverage it uses is strongly positive, which confirms our hypothesis that faster growing SMEs in transition economies rely more on external financing sources to support their growth in assets than on internally generated funds.

[19] Whereas it is not found that cash flow is significantly related to firm growth in their model, Honjo & Haranda (2006) argue that internal finance has less influence on firm growth, particularly of older SMEs that have already passed the early stages after establishment. Rather, internal finance may have more influence on the growth of younger SMEs.

[20] We run the same model specifications using growth in number of employees as dependant variable but the panel regressions yield unsatisfactory results – most of the variables in model (1) show no explanatory power in this case. Thus, we are unable to support or reject the findings of previous empirical studies that traditional firm characteristics may well explain firm growth when size is proxied by the number of firm employees.

Again, the effect of short-term liquidity (CUR_RATIO) on firm growth is very strong and positive, for all model specifications. Both CAP_PROD and LAB_PROD variables show a positive, statistically significant effect, in all model specifications, but this result should be treated with caution because of possible multicollinearity between the two variables. In general, we may conclude that improved factor productivity is associated with larger growth in firm assets. The other two variables (OP_REVEN and INTA_ASSETS) have the expected signs and are statistically significant at the usual level of 1 and 5 per cent, for all model specifications. Again, the data in Table 6 show that ownership, age and the sector a firm operates in have no explanatory power in our model. The Hausman test (see Models 4a and 6a) shows that we have to reject the random effects specifications (*p*-value is less than 0.05 in both cases). Thereby, we consider the individual effects as fixed.

In previous models we have observed and corrected for a correlation between residuals of order one. Yet, this does not exclude the possibility of a higher order correlation, which would be evidence of some dynamic relationship between the variables in the model. For that purpose, we need a linear dynamic panel-data model that includes lag of the dependent variable as explanatory variable and that contains unobserved panel-level effects, fixed or random. The generalized method of moments (GMM) is a suitable choice for that kind of models, which yields consistent estimators. GMM is a generalization of the classical method of moments[21]. Given the observations we have on our variables GMM helps us to find estimates for the model coefficients such that the expected values from the sample are satisfied as closely as possible. We employ one-step GMM estimator regression to our model specifications.

The results are presented in Tables 7 and 8. As expected, the time-lagged value of the dependant variable (OP_REVEN) is negative and statistically significant for all model specifications. The data in Table 7 show that leverage (as measured by that ratio of total debt to total assets) has no significant effect on a firm's growth in sales; the estimated coefficients of the LEVER variable are positive and statistically insignificant for all model specifications. This result doesn't support the findings of some recent empirical studies that SMEs rely on internally generated funds for assets growth but need access to external capital to support their growth in sales (see Honjo, & Haranda, 2006). Internally generated funds (as measured by cash flow ratio) show a strong, positive correlation with firm growth (see Models 1 through 7). This result supports our hypothesis that firms with large cash flows will grow faster. Contrary to our expectations, short-term liquidity is found to have a significant but negative impact on growth in sales revenues. When the size variable (TOT_ASSETS) is dropped from model (1) because of possible multicollinearity with other variables, this effect becomes even stronger (all estimated coefficients except for Model 4 are statistically significant at 1 per cent). Thus, we have to reject the hypothesis that firms with more growth opportunities will keep higher liquidity levels and thus will face less severe financing constraints.

Both TOT_ASSETS and EMPLOYE variables show strong explanatory power in all model specifications. The estimated results are consistent with those of recent empirical studies (see

[21] Generalized method of moments (GMM) is based on Arellano and Bond (1991)'s one-step robust estimates. The presence of first-order autocorrelation in the differenced errors does not imply that the estimates are inconsistent, but the presence of second-order autocorrelation would imply that the estimates are inconsistent.

e.g., Wiklund & Shepherd, 2005) that show a positive relationship between firm growth and size (as measured by its total assets or number of employees). As expected, productivity factors (as proxied by CAP_PROD and LAB_PROD variables) demonstrate strong explanatory power in all model specifications. Again, we have to read this result with caution as LAB_PROD variable is significantly correlated with both sales revenues and capital productivity (see Table 3).

The only two variables that seem to have no significant effect on firm growth are intangible assets as proxy for future growth opportunities, and age. The coefficients of the AGE variable are positive but statistically insignificant in all model specifications. This result does not support our hypothesis that younger firms are more likely to grow faster than older ones but it seems logical as we do not have start-ups or firms younger than five years old, included in the sample. The two dummies used as proxies for ownership and the sector a firm operates seem to be insignificant determinants of SME growth. Thus, we cannot provide evidence in support of the hypothesis that growth in manufacturing and service SMEs in transition economies is strongly associated with these two firm-specific characteristics. The results of the Arellano-Bond and Sargan tests (shown at the bottom of the table) confirm that all models are well specified.

[Insert Table 7 Here]
[Insert Table 8 Here]

When total assets are used as dependant variable in our regression analysis we obtain similar results to those in Table 6. Most of the firm-specific variables are statistically significant at 1 per cent and have the expected signs. The relation between a firm's degree of leverage and it growth is weak (all estimated coefficients of LEVER variable are marginally significant at 10 per cent and positive), which result is almost consistent with our hypothesis that SMEs in transition economies use predominantly external sources to support their growth in assets. When we analyze the effect of short-term liquidity on firm assets growth, the results reported in Table 8 suggest that firms with better investment opportunities will choose to maintain lower liquidity in order to support their current growth. The data in Table 8 support the notion that a firm's capability to generate capital internally (as measured by its cash flow ratio) plays an important role in explaining its growth; there is a strong but negative relation between INT_ASSETS variable and firm growth. This result supposes that SMEs in transition economies may rely less on internal capital to support the growth in their assets, especially in older firms that are less financially constrained. Although the EMPLOYE variable shows a statistically significant impact on firm growth (see Models 3 and 5) this result should be treated with caution as there is a high degree of collinearity between it and the LAB_PROD variable (see Table 3). When the latter is dropped from the rest of our model specifications, the EMPLOYE variable becomes statistically insignificant. Contrary to previous research AGE is found to have no significant effect on firm growth. The time-lagged value of dependant variable (TOT_ASSETS) is negative and statistically significant for all model specifications. The results of the Arellano-Bond and Sargan tests (shown at the bottom of the table) confirm that all model specifications (expect 2 and 4) are well specified.

4. Conclusion

This paper investigated the impact of firm-specific characteristics (age, size, internal finance, capital structure, growth opportunities, liquidity and factor productivity) on the growth of small and medium-sized enterprises. Using a panel data analysis for a set of 560 fast-growing SMEs in Central and Eastern Europe, we find that a firm's growth is related not only to the traditional determinant of size but also to other specific characteristics associated with its financial structure and productivity. In line with previous research, we find that firm size as measured by its total assets tends to increase sales revenues. At the same time, the growth in the number of employees in these firms shows a marginal impact on their growth in assets. Further, we find that the relation between future growth opportunities as proxied by the share of intangible assets in a firm's total assets and its growth is week (or even negative for some model specifications); this result can be explained by the fact that SMEs invest in R&D and other intangible assets but their impact on current growth is negligible as these are investments with no immediate but long term payoffs. Another important finding is that SMEs in transition economies rely predominantly on internally generated funds to support their sales growth but need access to external capital to support growth in their assets. Thus, we may conclude that firms with large cash flows will grow faster.

Contrary to our expectations, short-term liquidity is found to have a negative impact on growth in both sales revenues and assets. This finding suggests that firms with better investment opportunities will choose to maintain lower liquidity in order to support their current growth. The empirical results show that both capital and labor productivity are positively related to firm growth (both in sales and assets). This means that improved factor productivity will generate larger growth in these firms. In contrast to some previous empirical studies we find that age (that is, the number of years a firm exists as a business entity) and the sector a firm operates in (in our case, manufacturing or services) have no significant impact on firm growth. Also, we find no evidence that ownership (that is, whether a firm is publicly-traded or privately-held) is strongly associated with firm growth.

Our results are relevant for policy makers and firm managers of SMEs in transition economies. The evidence shows that small and medium-sized firms in these countries still rely on internally generated sources to support their growth and find it very difficult to obtain external finance. Thus, the governments in transition economies need to pay increased attention to small and medium-sized enterprises and try to create an environment that will be beneficial for SME development. Further, a better understanding of how firm-specific characteristics impact local firms' growth can help managers engage in more efficient decisions related to their capital structure in order to lower the cost of capital. Increasing the capital and labor productivity and investing more funds in research and development (or making a more efficient use of them) will help SMEs in transition economies improve their competitiveness on the EU market and thus, enhance their growth potential.

Unfortunately, the research does have some limitations. The most notable one is related to the lack of complete data for some proxy variables (e.g., short- and long-term debt) or variables that provide information for the educational background and international experience of SME managers. These variables are not included in the analysis. In addition, the empirical results are derived from a sample of transition economies, which includes a limited number of countries from Central and Eastern Europe. The study will improve if more SMEs with full data record from different CEE countries are included in the sample as firm characteristics vary from country to country. In order to address the other limitations discussed in the introductory part of the paper we need to introduce a control group (slower-growing firms in

this case) and also run the analysis separately for each country in the sample. The analysis will benefit if the smallest (micro) and youngest (less than 5 years of existence) firms are included in the dataset in order to examine whether the impact of the identified determinants of growth differ between the different groups of SMEs. We may also investigate the effect of different macroeconomic variables (such as GDP per capita, inflation and tax rates) known to be relevant growth determinants or use time dummies instead of macro variables. This will improve our future research.

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Table 1: Geographical distribution of sample firms by size, age and sector

	Bulgaria	Croatia	Czech Republic	Poland	Romania	Serbia	Total
Size							
Micro (< 10 employees)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Small (< 50 employees)	3	39	20	1	0	0	63
Medium (< 250 employees)	22	110	337	19	6	3	497
Total:	**25**	**149**	**357**	**20**	**6**	**3**	**560**
Age							
< 5 years	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5 -10 years	7	30	45	0	2	0	84
10 - 20 years	13	92	297	8	4	2	416
> 20 years	5	27	15	12	0	1	60
Total:	**25**	**149**	**357**	**20**	**6**	**3**	**560**
Sector							
Agriculture, fishing& mining	0	1	43	0	1	0	45
Construction	2	26	24	1	0	1	54
Financial intermediation	0	0	2	0	0	0	2
Hotels and restaurants	0	4	1	0	1	0	6
Manufacturing	8	26	180	7	4	2	227
Public administration, education, health and social work	0	1	6	0	0	0	7
Real estate, renting and business activities	3	11	17	10	0	0	41
Transport, storage and communication	2	8	13	0	0	0	23
Utilities	0	4	14	1	0	0	19
Wholesale and retail trade	7	65	48	1	0	0	121
Other	3	3	9	0	0	0	15
Total:	**25**	**149**	**357**	**20**	**6**	**3**	**560**

Source: AMADEUS database (2008). Authors calculations.

Table 2: Dependent and explanatory variables

Variable	Definition	Explanation	Expected sign
Dependant variables			
OP_REVEN	Change in operating revenues, proxy for growth, (in Euros, thousands)	Difference between the logarithms of firm's revenues in periods *t* and *t - 1*	
TOT_ASSETS	Change in book value of total assets, proxy for growth (in Euros, thousands)	Difference between the logarithms of firm's total assets in periods *t* and *t - 1*	
Explanatory variables			
TOT_ASSETS	Total assets, proxy for firm size (in Euros, thousands)	Difference between the logarithms of firm's total assets in periods *t* and *t - 1*	+
INTA_ASSETS	Intangible assets/total assets, proxy for future growth opportunities	Difference between the ratio of intangible to total assets in periods *t* and *t - 1*	-
CUR_RATIO	Current assets/current liabilities, proxy for short-term liquidity	Difference between the ratio of current assets to current liabilities in periods *t* and *t - 1*	+/-
LEVER	Total debt/total asset, proxy for a firm's degree of leverage	Difference between the ratio of total debt to total assets in periods *t* and *t - 1*	+
CAP_PROD	Operating revenues/tangible assets, proxy for capital productivity	Difference between the ratio of operating revenues to tangible assets in periods *t* and *t - 1*	+
LAB_PROD	Operating revenues/number of employees, proxy for labor productivity	Difference between the ratio of operating revenues to no. of employees in periods *t* and *t - 1*	+
CASH_FLOW	(Pre-tax income + depreciation)/total assets, proxy for internally generated capital	Difference between the firm's cash flow in periods *t* and *t - 1*	+/-
EMPLOYE	Number of employees, proxy for a firm size	Difference between the logarithms of firm's size in periods *t* and *t - 1*	+
AGE	Number of years of existence	Logarithm of firm's age (number of years of existence) in period *t*	-
OWNER	The type of the ownership of a firm – public or private	A dummy variable that takes on value of 1 for firms which are public entities or 0 otherwise.	+
SECTOR	The type of sector a firm operates in (manufacturing or services)	A dummy variable that takes on value of 1 for firms from services sector or 0 otherwise.	+

Table 3: Correlation matrix of the model variables[1]

	OP_REVEN	TOT_ASSETS	LEVER	CUR_RATIO	INTA_ASSETS	CAP_PROD	LAB_PROD	CF_RATIO	EMPLOYE	AGE
OP_REVEN	1.0000									
TOT_ASSETS	0.5485***	1.0000								
LEVER	0.1256***	-0.1406***	1.0000							
CUR_RATIO	-0.0291	-0.0202	-0.0861***	1.0000						
INTA_ASSETS	-0.1365***	-0.1187***	-0.0831***	-0.0850***	1.0000					
CAP_PROD	0.2670***	0.0255	0.2134***	-0.0273	-0.0491**	1.0000				
LAB_PROD	0.7328***	0.4307***	0.1687***	-0.0367*	-0.0998***	0.3179***	1.0000			
CF_RATIO	-0.0729***	-0.0809***	0.1118***	-0.1029***	0.0668***	-0.0305	-0.0529***	1.0000		
EMPLOYE	-0.0379**	0.0301	-0.2369***	0.0586***	-0.0010	-0.2038***	-0.3704***	-0.1103***	1.0000	
AGE	-0.0526***	0.1467***	0.0015	-0.0341*	0.0062	-0.0463*	-0.0668***	-0.0356*	0.1231***	1.0000

* indicates that correlation is significant at the 10 percent level
** indicates that correlation is significant at the 5 percent level
*** indicates that correlation is significant at the 1 percent level

Note:
1. The dependant and explanatory variables included in the model are: Operating revenues (OP_REVEN), Total assets (TOT_ASSETS), Leverage (LEVER), Current ratio (CUR_RATIO), Growth opportunities (INTA_ASSETS), Capital productivity (CAP_PROD), Labor productivity (LAB_PROD), Cash flow (CF_RATIO), Number of employees (EMPLOYE), and Age (AGE). Dummy variables for ownerships and sector are not included in the correlation matrix.

Table 4: Summary statistics (total sample)[1]

Variable	Obs.	Mean	Median	St. Dev.	Minimum	Maximum
OP_REVEN	2800	9,614.92	6,159.0	15,474.61	0	295,404
TOT_ASSETS	2800	7,969.02	4,716.5	11,310.25	32	133,779
LEVER	2800	0.1921	0.1509	.1754	0	0.9635037
CUR_RATIO	2800	1.8109	1.4076	1.5104	0	10.0
INTA_ASSETS	2656	0.0344	0.0011	.1215	0	.9740
CAP_PROD	2651	9.21	3.4336	27.34	0	489.93
LAB_PROD	2800	121.88	43.312	265.11	0	6,713.72
CF_RATIO	2653	0.4632	0.1264	2.77	-0.315	106.01
EMPLOYE	2800	126.09	150	58.62	10	250
AGE	2800	15.82	13.2	11.11	5.8	99.1

Notes:
1. The dependant and explanatory variables included in the model are: Operating revenues (OP_REVEN), Total assets (TOT_ASSETS), Leverage (LEVER), Current ratio (CUR_RATIO), Growth opportunities (INTA_ASSETS), Capital productivity (CAP_PROD), Labor productivity (LAB_PROD), Cash flow (CF_RATIO), Number of employees (EMPLOY), and Age (AGE). Dummy variables for ownerships and sector are not included in the summary statistics.
2. All variables are taken as ratios, except for Total assets and Operating revenues (in Euros, thousands) and Number of employees.

Table 5: Operating revenues panel regressions (2001-2005), total sample[1, 2, 3, 4, 5]

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 4a	Model 5	Model 6	Model 6a
	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Random effects	Fixed effects	Fixed effects	Random effects
TOT_ASSETS	1.716***	1.795***		1.796***	1.629***			
	(0.000)	(0.000)		(0.000)	(0.000)			
LEVER	0.326**	0.356**	0.003	0.352**	0.285**			
	(0.048)	(0.033)	(0.987)	(0.034)	(0.057)			
CUR_RATIO	0.154***	0.152***	0.274***	0.152***	0.165***	0.274***	0.282***	0.275***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INTA_ASSETS	-2.090***	-2.131***	-4.397***	-2.135***	-2.208***	-4.397***	-4.711***	-4.295***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAP_PROD	0.001	0.003***	0.003**	0.003***	0.003***	0.003**	0.008***	0.007***
	(0.222)	(0.006)	(0.032)	(0.006)	(0.002)	(0.031)	(0.000)	(0.000)
LAB_PROD	0.001***		0.002***			0.002***		
	(0.000)		(0.000)			(0.000)		
CF_RATIO	0.042***	0.044***	0.062***	0.044***	0.037***	0.062***	0.068***	0.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EMPLOYE	0.210**	0.043	0.411***			0.411***	0.045	0.041
	(0.053)	(0.666)	(0.002)			(0.002)	(0.656)	(0.647)
AGE	(dropped)	(dropped)	(dropped)			(dropped)		
SECTOR	(dropped)	(dropped)	(dropped)			(dropped)		
OWNER	(dropped)	(dropped)	(dropped)			(dropped)		
R-squared (within)	0.6225	0.6136	0.4369	0.6135	0.6127	0.4369	0.4010	0.4006
Number of observations	1999	1999	1999	1999	1999	1999	1999	1999
P-value for Hausman test[5]					0.0000			0.0018

Notes:
1) Model 1 - general model; Model 2 – excluding LAB_PROD variable; Model 3 – excluding TOT_ASSETS variable; Model 4 – excluding LAB_PROD and EMPLOYE variables; Model 5 – excluding TOT_ASSETS and LEVER variables; Model 6 – excluding TOT_ASSETS, LEVER and LAB_PROD variables. Models 4a and 6a – Random effects.
2) All variables except dummies and ratios are in logs.
3) *, **, and *** represent significance at 10, 5, and 1 percent, respectively. All regressions include source country dummies to control for source country effects.

4) *P*-values in brackets.
5) The null hypothesis for the Hausman test is that the difference in coefficients between fixed effects and random effects specifications is not systematic. Thus a small p-value (<0.05) suggests the rejection of the random effects specification.

Table 6: Total assets panel regressions (2001-2005), total sample[1, 2, 3, 4, 5]

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 4a	Model 5	Model 6	Model 6a
	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Random effects	Fixed effects	Fixed effects	Random effects
OP_REVEN	0.192***	0.197***		0.197***	0.190***			
	(0.000)	(0.000)		(0.000)	(0.000)			
LEVER	0.189***	0.186***	0.208***	0.187***	0.155***	0.200***	0.206***	0.170***
	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.005)	(0.004)	(0.008)
CUR_RATIO	0.017***	0.016***	0.082***	0.016***	0.015***	0.085***	0.085***	0.080***
	(0.001)	(0.002)	(0.000)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)
INTA_ASSETS	-0.499***	-0.500***	-1.341***	-0.501***	-0.459***	-1.420***	-1.428***	-1.281***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAP_PROD	0.001	0.001*	0.001**	0.001*	0.001**	0.002***	0.002***	0.003***
	(0.351)	(0.079)	(0.021)	(0.080)	(0.016)	(0.000)	(0.000)	(0.000)
LAB_PROD	0.001***		0.001***					
	(0.002)		(0.000)					
CF_RATIO	-0.049***	-0.049***	-0.072***	-0.049***	-0.051***	-0.075***	-0.075***	-0.075***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EMPLOYE	0.038	-0.007	0.089*			-0.061		
	(0.291)	(0.832)	(0.057)			(0.162)		
AGE	(dropped)	(dropped)	(dropped)			(dropped)		
SECTOR	(dropped)	(dropped)	(dropped)			(dropped)		
OWNER	(dropped)	(dropped)	(dropped)			(dropped)		
R-squared (overall)	0.6514	0.6490	0.5417	0.6490	0.6483	0.5214	0.5208	0.5208
Number of observations	1999	1999	2059	1999	1999	2059	2059	2059
P-value for Hausman test[5]					0.0002			0.0001

Notes:

1) Model 1 - general model; Model 2 – excluding LAB_PROD variable; Model 3 – excluding OP_REVEN variable; Model 4 – excluding LAB_PROD and EMPLOYE variables; Model 5 – excluding OP_REVEN and LAB_PROD variables; Model 6 – excluding OP_REVEN, LAB_PROD and EMPLOYE variables. Models 4a and 6a – Random effects.

2) All variables, expect dummies and ratios are in logs.

3) *, **, and *** represent significance at 10, 5, and 1 percent, respectively. All regressions include source country dummies to control for source country effects.

4) *P*-values in brackets.
5) The null hypothesis for the Hausman test is that the difference in coefficients between fixed effects and random effects specifications is not systematic. Thus a small p-value (<0.05) suggests the rejection of the random effects specification.

Table 7: Operating revenues GMM panel regressions (2001-2005), total sample[1, 2, 3, 4, 5, 6]

Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
OP_REVEN (lagged)	-0.017***	-0.018***	-0.021***	-0.017***	-0.023***	-0.023***	-0.023***
	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TOT_ASSETS	0.295***	0.294***		0.429***			
	(0.000)	(0.000)		(0.000)			
LEVER	0.023	0.021	-0.049	0.009			
	(0.702)	(0.726)	(0.441)	(0.896)			
CUR_RATIO	-0.011*	-0.011*	-0.021***	-0.008	-0.021***	-0.022***	-0.021***
	(0.097)	(0.098)	(0.003)	(0.310)	(0.003)	(0.008)	(0.009)
INTA_ASSETS	0.349	0.346	0.349	0.449	0.342	0.458	
	(0.255)	(0.257)	(0.268)	(0.208)	(0.275)	(0.219)	
CAP_PROD	0.001**	0.001**	0.001*	0.003*	0.001**	0.003***	0.003***
	(0.016)	(0.015)	(0.067)	(0.000)	(0.054)	(0.000)	(0.000)
LAB_PROD	0.001***	0.001***	0.001***		0.001***		
	(0.000)	(0.000)	(0.000)		(0.000)		
CF_RATIO	0.901***	0.899***	0.846***	1.142***	0.849***	1.095***	1.080***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EMPLOYE	0.406***	0.404***	0.432***	0.189***	0.430***	0.201***	0.201***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AGE	0.003		0.004				
	(0.755)		(0.652)				
SECTOR	(dropped)		(dropped)				
OWNER	(dropped)		(dropped)				
Number of observations	1011	1011	1011	1011	1011	1011	1011
Arellano-Bond test - Prob > *z*		0.0370		0.0672	0.0221	0.0612	0.0604
Sargan test - Prob > χ^2		0.6690		0.5046	0.8568	0.6612	0.6689

Notes:
1) Model 1 - general model; Model 2 – excluding AGE variable; Model 3 – excluding TOT_ASSETS variable; Model 4 – excluding AGE and LAB_PROD variables; Model 5 - excluding TOT_ASSETS and LEVER variables; Model 6 – excluding LAB_PROD variable; and Model 7 – excluding INTA_ASSETS variable.

2) All variables except dummies and ratios are in logs.
3) *, **, and *** represent significance at 10, 5, and 1 percent, respectively. All regressions include source country dummies to control for source country effects.
4) *P*-values in brackets.
5) For Arellano-Bond test Ho is: no autocorrelation. Rejecting the null hypothesis (p-value <0.05) of no serial correlation at order one in the first-differenced errors does not imply that the model is misspecified. Rejecting the null hypothesis at higher orders implies that the moment conditions are not valid.
6) For Sargan test Ho is: overidentifying restrictions are valid. If p-value >0.05, we confirm the null hypothesis that the overidentifying restrictions are valid. Rejecting the null hypothesis implies that we need to reconsider our model or our instruments.

Table 8: Total assets GMM panel regressions (2001-2005), total sample[1, 2, 3, 4, 5, 6]

Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
TOT_ASSETS (lagged)	-0.038***	-0.043***	-0.037***	-0.043***	-0.048***	-0.048***	-0.047***	-0.046***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
OP_REVEN	0.203***	0.199***		0.219***				
	(0.000)	(0.000)		(0.000)				
LEVER	0.076	0.076	0.098**	0.075	0.092*	0.097*	0.091*	0.093*
	(0.115)	(0.112)	(0.051)	(0.116)	(0.060)	(0.054)	(0.069)	(0.065)
CUR_RATIO	-0.030***	-0.030***	-0.034***	-0.029***	-0.034***	-0.035***	-0.035***	-0.035***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INTA_ASSETS	-0.064	-0.060	0.001	-0.062	-0.006	0.032	0.021	
	(0.808)	(0.819)	(0.994)	(0.813)	(0.980)	(0.908)	(0.937)	
CAP_PROD	0.001***	0.001***	0.001**	0.001***	0.001**	-0.000		
	(0.003)	(0.003)	(0.017)	(0.006)	(0.015)	(0.377)		
LAB_PROD	0.000	0.000	0.001***		0.001***			
	(0.198)	(0.181)	(0.000)		(0.000)			
CF_RATIO	-0.342***	-0.339***	-.177**	-0.342***	-0.177**	-0.108	-0.114*	-0.117*
	(0.000)	(0.000)	(0.013)	(0.000)	(0.013)	(0.132)	(0.101)	(0.100)
EMPLOYE	-0.010	-0.011	0.085***	-0.031	0.079***	0.017	0.016	0.016
	(0.718)	(0.701)	(0.002)	(0.213)	(0.004)	(0.496)	(0.524)	(0.520)
AGE	0.004		0.011					
	(0.530)		(0.117)					
SECTOR	(dropped)		(dropped)					
OWNER	(dropped)		(dropped)					
Number of observations	1097	1097	1097	1097	1097	1097	1097	1011
Arellano-Bond test - Prob > z		0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Sargan test - Prob > χ^2		0.0225		0.0214	0.0491	0.0548	0.0658	0.0619

Notes:
1) Model 1 - general model; Model 2 – excluding AGE variable; Model 3 – excluding TOT_ASSETS variable; Model 4 – excluding AGE and LAB_PROD variables; Model 5 - excluding TOT_ASSETS and LEVER variables; Model 6 – excluding LAB_PROD variable; and Model 7 – excluding INTA_ASSETS variable.
2) All variables, expect dummies and ratios are in logs.

3) *, **, and *** represent significance at 10, 5, and 1 percent, respectively. All regressions include source country dummies to control for source country effects.
4) *P*-values in brackets.
5) For Arellano-Bond test Ho is: no autocorrelation. Rejecting the null hypothesis (p-value <0.05) of no serial correlation at order one in the first-differenced errors does not imply that the model is misspecified. Rejecting the null hypothesis at higher orders implies that the moment conditions are not valid.
6) For Sargan test Ho is: overidentifying restrictions are valid. If p-value >0.05, we confirm the null hypothesis that the overidentifying restrictions are valid. Rejecting the null hypothesis implies that we need to reconsider our model or our instruments.