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**Are SMEs large firms en miniature?
Evidence from a growth analysis**

by Christina E. Bannier and Sabrina Metz

April 2010

Are SMEs large firms en miniature?

Evidence from a growth analysis

Christina E. Bannier*and Sabrina Metz†

April 30, 2010

Abstract

Based on German data between 1999 and 2007, we analyze the growth factors of SMEs and contrast them with those of large firms. Differences show up both in balance sheet and employment growth. While we confirm earlier results on inherent growth structures and the influence of firm age, we derive several new, complex growth effects that set SMEs apart: particularly ownership type and ownership structure play a distinctive role that may additionally interact with other variables affecting growth, such as, e.g. profitability or capital structure. As such, the distinction - according to size - between SMEs and large firms may not be sufficiently meaningful unless combined with further information on ownership type and structure and, preferably, also on firm age.

JEL Classification: G3, L25

Keywords: Small and medium-sized enterprises, growth analysis, panel analysis, system GMM estimation

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1 Introduction

Do small and large firms differ in their growth development? Particularly in European countries, where traditionally a large proportion of firms are small and medium-sized enterprises (SMEs) that produce a major part of output and employ the majority of the workforce, this question is of relevance - both to market participants as well as politicians that strive to support the companies' development. Recently, several studies have argued that SMEs pursue stability and independence rather than financial performance and growth and, hence, define different success factors than large firms (Walker and Brown, 2004; Gutter and Saleem, 2005; Vos and Roulston, 2008). While these studies are broadly based on questionnaire and survey data, it has also been shown that small companies' dissimilarities are reflected in their balance sheets. Particularly the chosen capital structure has been shown to conform well with the goal of stability by displaying a high degree of "financial contentment" (Vos et al., 2007). In this paper, we focus on a related aspect and ask whether the characteristics of SMEs also lead to a different growth pattern in comparison to large firms.

Following a "growth as an outcome" approach à la McKelvie and Wiklund (2010), we analyze different growth factors and study whether they exert deviating effects on small firms' growth development vis-à-vis large firms' growth behavior.¹ We scrutinize both the impact that exogenous factors such as the macroeconomic environment may have, but also examine endogenous drivers of growth such as the chosen governance as well as capital structure, and performance measures.

We use a dataset on German firms between 1999 and 2007, the longest most recent time period in which information is available on variables relating to firm-specific items, balance sheet and income statements. Since even among the smaller firms in our sample a significant proportion is incorporated and some are actually publicly-listed, we are able to derive interesting results by comparing both private and publicly-listed SMEs with their large counterparts. Particularly in Germany, where a large part of the public debate focuses on the so-called Mittelstand that typically consists of medium-sized family firms that are incorporated, our results may help to fill the gap to earlier academic studies that mainly analyzed non-incorporated small firms.

In a Penrosean view of growth based on "human and other resources" (Penrose, 1959), our analysis considers growth both with respect to total assets (size of the balance sheet) and total employment (size of the workforce). While the number of employees may be more directly under the control of a firm's management and, hence, a more straightforward outlet for any growth effort, the amount of total

¹As the subject of firm growth is of importance to many fields of research e.g. economics and management, there have been many attempts to classify the vast literature into coherent streams of literature. We follow the latest attempt of McKelvie and Wiklund (2010) who differentiate between the following three streams: (i) Growth as an Outcome, (ii) The Outcome of Growth, and (iii) The Growth Process.

assets is one of the most widely used measures of firm size (Coad, 2009). We therefore rely on both variables in order to capture firm growth.²

We employ a System-GMM dynamic panel estimation procedure based on Arellano and Bover (1995) and Blundell and Bond (1998) in order to deal with the specific needs of our testing procedure. Our main general finding is that SMEs indeed show a different growth behavior than large firms. However, the differences are complex and depend vigorously on the firms' governance structure. More specifically, we observe particularly strong disparities with regard to balance sheet growth. While large firms' total assets tend to follow a concave growth path, smaller firms' growth processes show positive serial correlation. Additionally, SMEs appear to be strongly affected by the business cycle while large firms are not. Confirming earlier research, we find that the amount of equity available is decisive only for very young, very small firms (Carpenter and Peterson, 2002; Berger and Udell, 1998). A hitherto undetected growth-effect refers to the complex influence of firms' profitability: while SMEs show an overall positive effect of profitability on balance sheet growth, this impact appears to be entirely driven by those SMEs with sufficiently high equity capital. For large firms, in contrast, we find that the overall negative growth-effect of profitability stems solely from the publicly-listed companies, while privately-held large firms display a positive dependence. Interestingly, the ownership nature and structure has further effects on firm growth: while the number of shareholders reduces balance sheet growth for large firms in general, it increases growth for SMEs provided they are privately-held. At the same time, if the largest shareholder is a family or an individual, this boosts growth both for small and large firms.

As regards employment growth, SMEs and large firms show less distinct behavior: they both follow a positive growth path that is flattened over the years. However, while SMEs' dependence on the business cycle is less strong than for balance sheet growth, large firms even appear to vary their workforce anti-cyclically. Overall, the capital structure seems to be less decisive for employment growth. But the ownership structure still plays an important role: while the number of shareholders displays the same effect as for balance sheet growth, we obtain further complex effects of the profitability variable that are opposing the ones on total assets growth: higher profitability increases (reduces) growth for SMEs if they are privately-held (publicly-listed), and vice versa for large firms.

Overall, our results lead us to conclude that - depending on the context - the simple distinction between small and medium-sized firms on the one hand and large firms on the other hand does not necessarily contain sufficient discriminatory content to make unambiguous statements. As regards questions of growth behavior, it appears important to combine this basic distinction according to size

²Even though sales volumes are also frequently used as a growth measure, we believe that sales, particularly for SMEs, are too strongly driven by external forces such as exchange rates or inflation and hardly reflect managements' growth efforts. We therefore follow a similar argument as in Delmar et al. (2003) and do not examine sales' growth.

with a differentiation according to the ownership nature and, if possible, also with age to render a meaningful assessment. As such, equity constraints seem to be hindering growth only for young, small firms but not for SMEs in general. Higher profitability, as another example, does not necessarily lead to stronger growth, but its effect is strongly dependent on company size and its private / public nature of ownership. As such, any policy measures taken with the aim to boost SME growth must take these aspects carefully into account.

The rest of the paper proceeds as follows. Section 2 reviews the literature and describes the growth factors to be considered in the further analysis. Section 3 delineates the model specification and estimation, while section 4 describes the data set. Section 5 shows the results from a general model on balance sheet growth and employment growth. Section 6 displays some more specific analyses on the role of the capital structure and of the firms' ownership and governance structure. Section 7 concludes.

2 Growth factors

Earlier work has discovered many important drivers of firm growth. Remarkably, however, previous research has often yielded conflicting results with regard to SMEs growth behavior. According to Coad (2009), firm growth seems to be an extremely complex process that has to be explained in small steps rather than in a roundabout way. Our analysis tries to follow this advice as carefully as possible. Generally, growth factors can be differentiated into those that are *(i)* inherent in the firm and, as such, in the growth process, e.g. self-accelerating or self-decreasing effects, that are *(ii)* exogenous to the firm and as such cannot be altered or avoided and *(iii)* that are endogenous in that the company chooses them actively in order to influence the growth process. As regards the underlying hypothesis differentiating between the growth processes of smaller and larger firms, it may be the case that SMEs are simply “not yet” large firms that try to reach the “large firm”-status as soon as possible or, alternatively, that SMEs are a special type of firm in their own right and do not aspire to take on the same characteristics as displayed by large firms.

Among the inherent growth factors, a company's size and age are the most frequently cited ones. Based on Gibrats (1931) “law of proportionate effect”, numerous empirical studies have tested the relationship between firm growth and size. While earlier studies focused mainly on datasets made up of large firms and found a positive dependence, more recent studies showed that, on average, smaller firms seem to grow faster than larger firms (Evans, 1987; Hall, 1987; Dunne and Hughes, 1994; Bottazzi and Secchi, 2003). For large companies, age seems to be closely related to size, so that the negative dependence of firm growth on age has been supported by many analyses on large firms (Evans, 1987; Geroski and Gugler, 1994). Analyses on SMEs often include the company age merely as a control factor

but tend to find a negative relationship to growth as well (Das, 1995; Harhoff et al., 1998; Huynh and Petrunia, 2010).

Further control factors that have been covered by cross-sectoral studies on firm growth are the industry in which the firm is active and also the geographical region of the firm's business (Dunne and Hughes, 1994; Niskanen and Niskanen, 2005). Very often, both growth factors play a significant role. Audretsch and Dohse (2007) confirm a positive growth effect of regions rich in knowledge resources, while studies focusing on Germany generally observe stronger growth effects in the western parts of Germany (Almus et al., 1999). To the best of our knowledge, there are hardly any studies comparing the effects of these growth factors on SMEs with those on large firms.

With regard to exogenous growth factors that are not under the direct control of the firm's management, two appear particularly relevant: the macroeconomic environment and the firm's access to external capital. Very often, it has been found that the economic climate affects firm growth (Beck et al., 2005; Higson et al., 2002, 2004) and furthermore, that smaller firms appear to grow relatively faster during booms in contrast to their larger counterparts that appear to grow faster during recessions and recoveries (Hardwick and Adams, 2002). Firms' lack of access to external capital has frequently been mentioned as the main obstacle to SMEs growth. Analyses testing the relationship between capital constraints and growth usually run into the problem of measuring firm's individual financial constraints. While following the "q-theory of investment" by Fazzari et al. (1988), any sensitivities of a firm's investments to cash flows have been taken as a sign of capital constraints, Kaplan and Zingales (1997, 2000) have shown that this method is not without problems. Nevertheless, studies focusing on SMEs tend to apply this procedure as it appears to be the most readily-available measure of any financing restrictions for smaller companies. Wagenvoort (2003), e.g., confirms that the growth sensitivity to cash flow rises as firm size falls for European SMEs between 1996 and 2000.

Among endogenous growth factors, a plethora of different variables has been analyzed previously. What appears to be the most important growth drivers in this respect are firms' choices with respect to their liability and ownership structure, their capital structure and their payout policy, i.e. their use of earnings. Harhoff et al. (1998) and Mohnen and Nasev (2008) show that the legal form plays an important role for firm growth in that firms with limited liability display stronger growth than comparable companies under full liability. They argue that firms under limited liability have greater incentives to pursue risky projects that offer higher returns and, hence, feed growth. The choice of ownership status and ownership structure also appears to significantly impact growth. Arthurs and Busenitz (2006) and Florin (2005), for instance, report for IPOs of venture-owned firms that the listing induces positive growth effects as it requires the listed companies to generate higher growth in order to satisfy the new owners' demand for expected returns. Dunne et al. (1989) furthermore show that firms

which are owned by one large company display higher growth rates than comparable stand-alone firms. Based on a sample of SMEs listed in Taiwan, Chu (2009) proves that family ownership influences the return on assets and, hence, growth positively.

While firms' choice of capital structure has been in the focus of attention over many years, its relation to firm growth has primarily been based on the notion of sufficient capital as a prerequisite for growth, i.e. relating to the financing constraints literature (Carpenter and Petersen, 2002). Nevertheless, some recent studies focusing entirely on SMEs have come to the conclusion that their capital structure reflects a high degree of financial contentment in that they do not actively seek funding to induce growth (Vos et al., 2007; Vos and Roulston, 2008). The authors argue that SMEs are characterized by their owners' aversion to loss of control and their quest for stability, which lets them achieve a high degree of connectedness that suffices to ensure future financing without the need for additional external capital. Their argument is underlined by several recent studies that report SMEs general unwillingness to grow (Wiklund et al., 2003; Birley and Westhead, 1990; Gimeno et al., 1997). According to the traditional pecking order theory of capital structure (Myers and Majluf, 1984), in contrast, it should be expected that small and young companies that tend to be less well-known to the capital markets than larger firms, rely on either internal capital streams that follow the firms' profitability or on debt capital. Emphasizing the information asymmetry that may affect SMEs' financing relationships to a stronger degree than larger firms, Niskanen and Niskanen (2005) report that close lending relationships are growth enhancing for firms of all size brackets, while only larger firms benefit from higher banking competition.

As regards the use of firm profits as one further endogenous growth factor, the traditional claim is that growth rates rise with profitability as firms retain their earnings (Downie, 1958). Nevertheless, the effect of financial performance on firm growth is far from unambiguous. While Coad (2007) is able to derive a statistically significant relationship between financial performance and sales growth for a sample of French manufacturing firms, the economic significance of this influence is very small. A similarly weak dependence is observed by Bottazzi et al. (2007) on a sample of Italian firms.

While all three sets of growth factors - firm-inherent, exogenous and endogenous variables - may contribute to an analysis of whether, and if so why, smaller firms' growth behavior differs from larger firms' growth development, particularly the endogenous growth drivers may be expected to deliver interesting results. If SMEs are simply "little giants", they may put strong effort in using all available means to strengthen their growth process. I.e., they should be expected to decide on a legal and ownership form that promotes growth and to generate a particular capital structure that allows to finance growth processes cheaply. In contrast, if SMEs truly follow their own agenda, particularly the endogenous growth factors should reflect this by showing distinct or even opposing effects as compared

to large firms. Differences in the growth impact of exogenous growth factors, on the other hand, may be mere signs of SMEs' smaller means to accommodate to these external forces: they are typically less diversified, dispose of smaller capital buffers and a larger proportion of their workforce may be subject to labor market restrictions and hence difficult to dismiss.

3 Model specification and estimation

Our empirical testing procedure takes into account all of the aforementioned growth factors in order to be able to explain firms' growth processes most comprehensively. In contrast to the earlier literature, however, we run separate regressions on the SME sample and the large firm sample. By comparing the growth sensitivities, i.e. the growth factors' coefficients - both with respect to statistical and economic significance and sign - we hope to be able to see whether the two sets of firms behave any differently in their growth process.

According to the former description of potential growth factors, the following variables will be employed in our analyses: Firm growth ($\Delta\text{LogSIZE}$) as the dependent variable is measured in two ways: by the amount of total assets and by the number of employees. Following a dynamic approach towards the inherent growth factors, we use the respective lagged growth rate as a first growth variable on the right-hand-side of the regression equation ($L.\Delta\text{LogSIZE}$). Firm age is included as an additional inherent growth driver, both in logarithmic form (LogAGE) and as the squared logarithm (LogAGE^2) to take into account the extreme effects of this variable. In order to capture the exogenous effect of the economic climate, we include both the current level of GDP as well as the lagged level of GDP ($L.GDP$). Alternatively, we run regressions where we include the growth rate of GDP as explanatory variable ($GDPGR$). The corporate governance structure of firms is described by the dummy variable $LEGAL$ that takes a value of 1 if the firm is a corporation (either GmbH or AG) and 0 otherwise, by the dummy variable $PUBLIC$ that takes a value of 1 if the firm is publicly listed and 0 otherwise, by the number of shareholders ($NUMBSH$), and the type of the largest shareholder ($TYPESH$). The latter variable takes on a value of 1 for individuals and families and 0 otherwise. The capital structure is proxied either by the equity ratio (ER) or the leverage (LEV). Performance-related variables, finally, are the logarithm of total sales (LogSALES) and profitability ($PROF$) measured as net income divided by total sales. We also include additional control factors such as an industry dummy taking on the value of 1 for manufacturing or construction and a region dummy taking on the value of 1 for companies in the West-German Länder.

Our general specification for the firm growth regression is hence given as follows:

$$\begin{aligned}
\Delta \text{LogSIZE}_{it} = & \alpha_i + \beta L.\Delta \text{LogSIZE}_{it} + \gamma_1 \text{LogAGE}_{it} + \gamma_2 \text{LogAGE2}_{it} \\
& + \delta_1 \text{GDP}_t + \delta_2 L.\text{GDP}_t + \phi \text{Gov}_{it} + \eta_1 \text{LogSALES}_{it} \\
& + \eta_2 \text{PROF}_{i,t} + \eta_3 \text{Cap}_{it} + \varepsilon_{it}
\end{aligned} \tag{1}$$

Note that *SIZE* is measured both by the amount of total assets and by the number of employees. *Gov* is a vector of regressors including the legal dummy, the public dummy, the number of shareholders and the type of largest shareholder. *Cap* refers to the capital structure, proxied either by the equity ratio or the leverage.

Quite obviously, via the use of endogenous growth factors, our empirical testing procedure gives rise to several instances of endogeneity: firms may choose particular means in order to boost or hamper growth that are subsequently influenced by the growth process. Further econometric difficulties arise as we assume a dynamic growth process and therefore consider that the current growth level may be influenced by its past realizations. Finally, even after controlling for individual fixed effects the remaining idiosyncratic disturbances may still display individual-specific patterns of heteroskedasticity and serial correlation. Given these difficulties, we have to employ an estimation procedure that allows *i)* to include the lagged dependent variable as regressor and *(ii)* to instrument the endogenous regressors with only a limited set of variables available as instruments.

In order to deal with these effects, we proceed in a similar way as Brown et al. (2009) and Huynh and Petrunia (2010) and employ a System-GMM dynamic panel estimation procedure based on Arellano and Bover (1995) and Blundell and Bond (1998). For small-T, large-N panels, the System-GMM estimation is usually more efficient than the Difference-GMM estimation by Arellano and Bond (1991). As instruments we use the lagged values of the endogenous regressors. We treat the lagged dependent variable, the capital structure measured by either the equity ratio or the leverage, as well as the profitability measures total sales and profitability as endogenous variables in this respect. Note that the System-GMM estimation procedure takes first differences of the observations in levels to eliminate firm-specific effects. Then, lagged values of the regressors from the levels regression are used as instruments to eliminate any inconsistencies arising from the simultaneity bias. In comparison with other instrumental variables, such as two-stage least squares (2SLS) which are special cases of GMM, the GMM estimates are more efficient when regression errors are heteroskedastic and/or autocorrelated (Billet et al., 2007). In the case of homoscedastic and autocorrelation-free regression errors, the two estimates coincide. Hence, GMM provides standard errors of the estimates that are heteroskedasticity and autocorrelation consistent. In line with Brown et al. (2009), we report only one-step estimates as two-step estimation typically yields standard errors that are downward biased especially in small samples (Arellano and

Bond, 1991; Windmeijer, 2005).

Furthermore, tests of over-identifying restrictions and, hence, of whether the instruments, as a group, appear exogenous are reported. Even though the Sargan statistics are highly significant for all of our regressions, this statistic is inconsistent as it is weakened by heteroscedasticity and autocorrelation. In order to deal with this, we installed a robust estimator, so that the Hansen J statistic is of relevance instead of the Sargan statistic. While the Hansen J statistic can be weakened by instrument proliferation, we furthermore report difference-in-Hansen statistics for the transformed equation and the levels equation (Roodman, 2006). Similarly to the Hansen J statistic, these tests also analyze whether the applied instruments are valid. The consistency of our results is furthermore confirmed by non-significant second-order serial correlation tests.

4 Data description, sample characteristics and univariate analysis

Our dataset comes from the DAFNE database, offered by Bureau van Dijk Electronic Publishing for the years 1999 to 2007. In line with the definition of SMEs by the Institut für Mittelstandsforschung in Bonn, we characterize as small and medium-sized companies those with less than 500 employees and turnover below 50 million Euros per year. Large companies have at least 500 employees and at least 50 million Euros turnover per year. According to these selection criteria (that we require to hold in every year of our sample period), we are left with 199 SMEs and 207 large companies. Deletion of firms with missing or obviously faulty data entries led to a sample of 108 SMEs and 84 large firms. For each of these firms we collect both general information such as the founding year, legal status, number of employees, industry etc. as well as balance sheet data and earnings statements.

With regard to liability and corporate structure, we find that in both sub-samples 95% of firms are incorporated: among SMEs, 30% are limited-liability companies (GmbH) and 65% are corporations (AG), while among big firms, 17% are limited-liability companies and 78% are corporations. Roughly half of them are publicly listed (56% of SMEs, 50% of large companies). Of the small and medium-sized (large) firms, 17% (10%) are held by individuals or families and 44% (64%) are owned by industrial companies. 89% of SMEs come from former Western German states, 90% of large firms do so. With regard to industry, most large firms are active in manufacturing (42%), power supplies (26%) and logistics (10%), while for SMEs in our sample, the three most important industries are scientific and engineering services (22%), manufacturing (14%) and power supplies (14%). The ownership and industry distribution can also be seen from Figure 1 and Table 8 (in the appendix).

Table 1 gives further information on the descriptive statistics of our dataset. As can be seen, SMEs and large firms deviate strongly with respect total assets, the number of employees and total sales.

Figure 1: Type of Shareholder

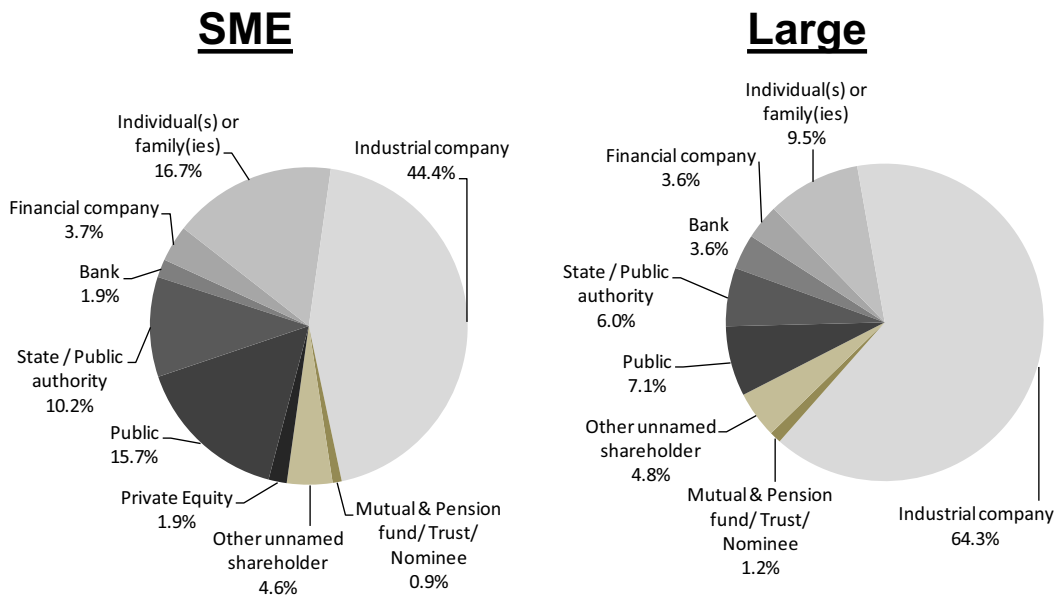


Table 1: Descriptive statistics

With the exception of total employment, company age, number of shareholders and ratios, all numbers are given in thousands of Euros. N refers to the number of observations. p -values of a tests on equality of means in the SME and Large subsample are reported in the last column.

Variable		N	Mean	Median	Std.Dev	p-value
Total assets	SME	929	76,990.23	33,507.00	137,412.00	0.0000
	Large	729	3,030,796.00	457,051.00	13,000,000.00	
Total employment	SME	842	79.66	58.50	81.07	0.0000
	Large	700	5,878.85	1,318.00	18,813.35	
Total sales	SME	928	16,991.94	13,761.00	14,470.41	0.0000
	Large	727	2,215,991.00	334,889.00	7,101,969.00	
Company age	SME	972	46.57	17.00	70.66	0.0016
	Large	756	55.81	34.00	50.87	
Number of shareholders	SME	926	6.37	3.00	9.52	0.0000
	Large	756	9.81	4.00	14.54	
Net income	SME	929	2,597.10	165.00	26,759.86	0.0003
	Large	729	101,917.80	9,513.00	741,233.10	
Profitability (=net income/turnover)	SME	928	-0.06	0.01	21.41	0.8976
	Large	727	0.03	0.03	0.09	
Equity	SME	929	38,237.65	13,596.00	78,065.22	0.0000
	Large	729	1,156,266.00	142,927.00	5,424,593.00	
Liabilities	SME	929	30,993.41	9,946.00	64,212.49	0.0000
	Large	729	1,164,681.00	120,209.00	6,354,082.00	
Equity ratio (=equity/total assets)	SME	929	0.46	0.44	0.24	0.0000
	Large	729	0.37	0.36	0.15	
Leverage (=debt/equity)	SME	918	4.58	0.76	87.24	0.2402
	Large	729	1.19	0.84	1.51	

With a median number of employees of 59, for instance, the SMEs in our sample are rather small. Also, SMEs are much younger than large companies: according to the median they are only half as old. SMEs have less shareholders and lower net income.

What may come as a surprise is that SMEs' equity ratio is larger than for large firms. Even though it is well-known that the growth rate in German SMEs' equity ratios has been stronger than for large firms over the last 15 years (Bannier and Grote, 2008), this observation is strongly driven by the fact that the SMEs in our sample tend to be incorporated companies with relatively large equity levels to start with. Figure 2 displays the development of equity ratios for SMEs and large firms between 1999-2007. It also contains the GDP growth rates during the time. While large firms appear to have reduced their equity ratios between 1999 and 2001, SMEs have continually increased it with only a small downward spike in 2004, which is most likely a result of the economic downturn in 2003.³ Complementing the comparison of equity ratios, we find that SMEs display a lower median leverage than large companies. However, the difference in leverage ratios is not statistically significant, due to the extremely high standard deviation of this ratio among SMEs. The large deviation between average and median leverage for SMEs moreover shows the skewness of the distribution. Analyses based on the firms' leverage should therefore be interpreted with caution.

Finally, Figure 3 - in the form of a simple univariate analysis - displays the median growth rates of small- and medium sized firms on the left and of large firms on the right, together with the GDP growth rates between 1999 and 2007. Both total assets and the number of employees are used as proxies of firm size. As can be seen from the figure, SMEs' growth rates hover quite narrowly around the GDP growth path, as such mirroring the conjectured dependency of SMEs from the general business cycle. While for both types of firms, the total assets growth rates (TAGR) follow the pattern of the business cycle relatively closely, even seem to precede it slightly, the growth rate for large firms moves around a much higher average. The employment growth rate (TEGR) of large firms clearly lags behind the business cycle and moves around a lower average, while the employment at smaller firms, in contrast, shows an overall much smoother development. Development of a firm's workforce hence appears to be more detached from the general economic climate, at least for SMEs. Thus, even though we do observe differences in growth levels from inspecting balance sheet and employment growth, we cannot yet conclude whether or not SMEs follow their own growth agenda or simply are large firms en miniature. The following multivariate analyses will dig deeper into this question.

³We suspect that this development at least is influenced by the increased risk awareness of financial institutions and the Basel Accords, especially Basel II.

Figure 2: Equity Ratios of SMEs and Large Firms with GDP Growth Rate

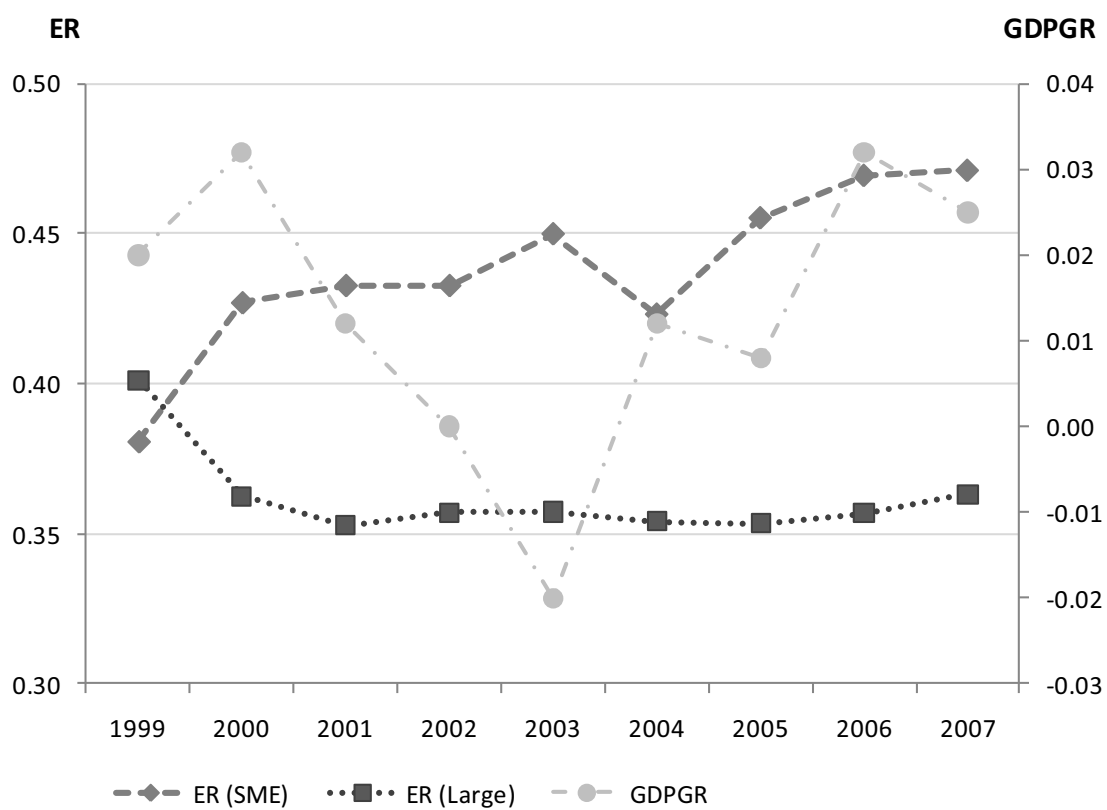
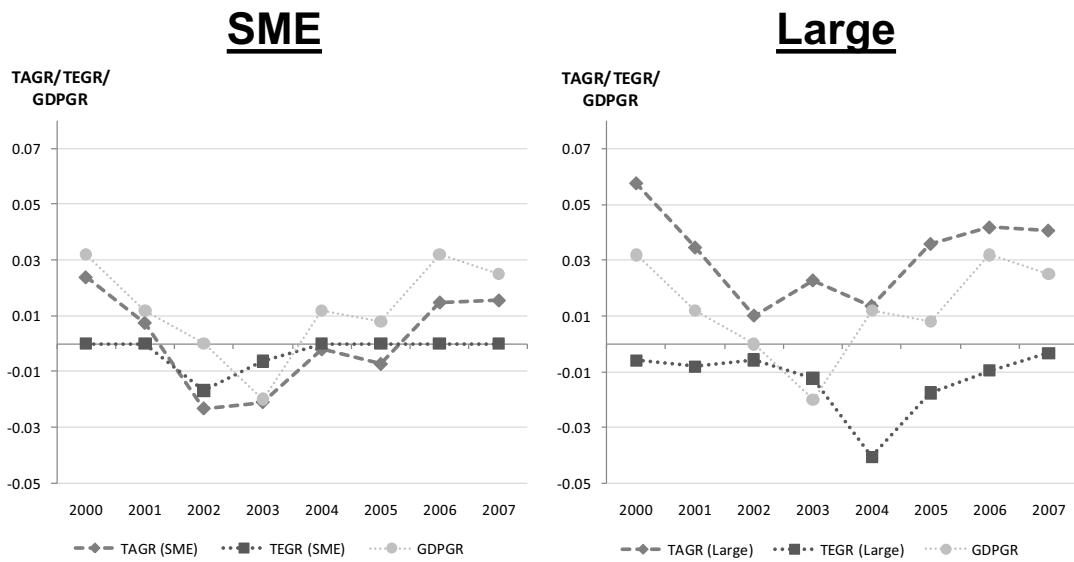


Figure 3: Total Assets and Employment Growth Rates and the Business Cycle



5 General Results

5.1 Growth of total assets

Table 2 displays the main results with respect to balance sheet growth. We find only weak indication of a positive serial correlation in the growth process of SMEs and absolutely no significant effect for large firms. Interestingly, firm age impacts only large firms' growth significantly. We observe a positive coefficient of the simple age variable and a negative coefficient of the squared age. Hence, the large firms in our sample seem to move along a concave growth curve according to the influence of their age, while the smaller firms display an increasing growth path corresponding to the - albeit weak - positive serial correlation.

As regards the business cycle, only SMEs' growth rates seem affected: the current level of GDP has a weakly significant positive influence on SMEs' balance sheet growth, while the GDP growth rate (used in models II, IV and VI) has a strongly significant positive impact. Note that the coefficient of the GDP growth rate is larger than 1 so that SMEs' balance sheets appear to overreact to business swings. For large firms, in contrast, we find no significant influence of the macroeconomic environment on growth.

With regard to internally generated financial means, we observe that total sales affect only large companies' growth rates positively. Hence, large firms seem to make use of higher cash flows via sales to boost growth. For smaller firms, in contrast, no such effect is found. Note, however, that the total sales variable rather than informing on any financing constraints could also serve as a simple proxy for size. In this respect we would interpret our finding as large firms growing the stronger, the larger they are already.

Contrasting earlier work by Harhoff et al. (1998) or Mohnen and Nasev (2008), the legal dummy does not exert a significant impact on firm growth. Neither does the industry dummy (not displayed in the table). Corresponding with Almus et al. (1999), the regional dummy plays a significant role for SMEs, so that SMEs in the western parts of Germany display stronger growth than in the eastern regions.⁴ Interestingly, the public dummy exerts a significant influence only for large firms, so that publicly-listed large companies show stronger balance sheet growth than non-listed large firms. Given that there is quite a number of incorporated small firms in our dataset, this is a remarkable result: there seems to be no difference as regards the balance sheet growth rate between SMEs that choose to be held privately and those that opt for a public listing, while there is a difference for large firms. Even more strikingly, we find that the number of shareholders is a significant factor driving growth both for

⁴For reasons of brevity, results for the industry dummy and region dummy are not displayed in the table. They are available from the authors upon request.

SMEs and large firms, but in opposite directions: a larger number of shareholders fosters balance sheet growth in smaller companies but hampers it in large firms. Also the type of the largest shareholder appears to play a significant role: both SMEs and large companies show stronger growth if the largest owner is an individual or a family rather than another company.

The profitability variable appears to have a positive impact on growth, both for SMEs and for large firms. Note that even though statistical significance appears to be slightly lower, the economic significance of this regressor is much stronger for large companies. It therefore seems to be the case that both types of firms use their profitability to boost balance sheet growth, large firms even more so than smaller companies.

Interestingly, we do not observe any significant effects from the equity ratio or the leverage ratio. On average, we therefore cannot state that SMEs seem more dependent on a high performance and the subsequent amount of internally-generated capital to support growth, nor on higher external equity or debt capital.

Table 2: Effects on total assets growth

System GMM regression on the difference of the current and last year's total assets in logs ($\Delta \text{LogSIZEta}$). SIZEta is total assets, L. refers to the one-period lag of the respective variable, LogAGE is the logarithm of company age, LogAGE2 the squared logarithm of company age, GDPGR is the GDP growth rate, NUMBSH the number of shareholders, PROF the profitability measured as net income divided by total sales, ER the equity ratio and LEV the leverage ratio. The lagged dependent variable, LogSALES, PROF, ER and LEV are instrumented. Industry dummies and region dummies are always included, but results are not displayed. ***, **, and * indicate significance at the 1%, 5%, and 10% level. p-values are given in parenthesis.

	(I)		(II)		(III)		(IV)		(V)		(VI)	
	SME	Large	SME	Large	SME	Large	SME	Large	SME	Large	SME	Large
Constant	-8833 (.216)	-1.0349** (.012)	-.3170 (.190)	-1.3264*** (.000)	-.7492 (.298)	-1.1741*** (.008)	-.1828 (.514)	-1.5919*** (.000)	-.5517 (.448)	-1.0902*** (.006)	-.0633 (.762)	-1.4110*** (.000)
L.Delta Log L.SIZEta	.1154* (.098)	.0592 (.533)	.1154 (.102)	.0640 (.499)	.1284* (.061)	.0332 (.710)	.1282* (.064)	.0371 (.679)	.1066 (.120)	.0452 (.601)	.1073 (.123)	.0508 (.555)
LogAGE	.0172 (.806)	.1219* (.052)	.0278 (.701)	.1191** (.047)	.0139 (.831)	.1415* (.079)	.0270 (.690)	.1376* (.076)	.0210 (.752)	.1277* (.054)	.0306 (.656)	.1246** (.050)
logAGE2	.0009 (.937)	-.0165* (.077)	-.0007 (.954)	-.0161* (.072)	.0011 (.912)	-.0200* (.098)	-.0006 (.955)	-.0194* (.095)	.0005 (.962)	-.0173* (.080)	-.0008 (.938)	-.0169* (.075)
GDP	$8.94e^{-7}$ (.062)	$7.94e^{-8}$ (.759)			$9.01e^{-7}$ (.066)	$9.43e^{-8}$ (.715)			$8.59e^{-7}$ (.075)	$9.02e^{-8}$ (.725)		
L.GDP	$-5.94e^{-7}$ (.407)	$-2.36e^{-7}$ (.526)			$-5.94e^{-7}$ (.429)	$-3.09e^{-7}$ (.409)			$-6.05e^{-7}$ (.409)	$-2.62e^{-7}$ (.479)		
GDPGR			1.3891*** (.004)	-.1532 (.651)			1.3996*** (.004)	-.2023 (.552)			1.2445*** (.009)	-.1622 (.634)
LogSALES	.0136 (.556)	.0907*** (.000)	.0197 (.408)	.0883*** (.000)	-.0001 (.997)	.1147*** (.000)	.0060 (.784)	.1123*** (.000)	-.0111 (.594)	.0967*** (.000)	-.0066 (.751)	.0942*** (.000)
LEGAL	-.0281 (.307)	-.0390 (.204)	-.0244 (.397)	-.0381 (.208)	-.0305 (.256)	-.0427 (.277)	-.0275 (.318)	-.0421 (.274)	-.0419 (.126)	-.0407 (.217)	-.0395 (.153)	-.0399 (.217)
PUBLIC	.0021 (.952)	.0607* (.052)	.0081 (.823)	.0601** (.049)	-.0104 (.766)	.1015** (.038)	-.0055 (.877)	.0989** (.040)	-.0145 (.664)	.0639** (.060)	-.0097 (.772)	.0632* (.057)
NUMBSH	.0027** (.015)	-.0055*** (.002)	.0028** (.014)	-.0053*** (.002)	.0026** (.024)	-.0070*** (.001)	.0026** (.024)	-.0068*** (.001)	.0026** (.029)	-.0058*** (.001)	.0026** (.027)	-.0057*** (.001)
TYPSH	.0442* (.095)	.0842* (.057)	.0465* (.084)	.0822* (.058)	.0396 (.136)	.1043* (.090)	.0414 (.125)	.1023* (.089)	.0537* (.062)	.0894* (.055)	.0563* (.051)	.0875* (.055)
PROF	.0008** (.033)	.2488* (.058)	.0008** (.044)	.2463* (.063)	.0009** (.020)	.1890* (.097)	.0009** (.025)	.1821 (.111)	.0009** (.013)	.2269** (.063)	.0009** (.014)	.2225* (.070)
ER					-.0272 (.887)	-.2063 (.331)	-.0004 (.998)	-.1903 (.363)				
LEV									-.0038 (.590)	.0004 (.916)	-.0044 (.529)	.0001 (.975)
No. of observations	674	556	674	556	674	556	674	556	665	556	665	556
F	8.44	3.69	7.55	3.77	10.75	4.53	10.14	4.72	10.07	4.00	8.31	4.14
Prob >F	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Sargan Prob > χ^2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Hansen Prob > χ^2	.663	.498	.548	.549	.437	.389	.365	.438	.484	.589	.521	.707
Arellano-Bond for AR(1) in 1st diff.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Arellano-Bond for AR(2) in 1st diff.	.523	.099	.516	.094	.553	.186	.562	.184	.674	.138	.669	.131
gmm instr. - Hansen excl. group	.441	.834	.144	.941	.601	.378	.314	.517	.182	.388	.183	.677
gmm instr. - Diff. (null H = exog.)	.728	.217	.896	.173	.310	.423	.451	.372	.776	.683	.817	.593
iv - Hansen excl. group	.455	.572	.448	.655	.279	.312	.281	.368	.294	.449	.284	.518
iv - Diff. (null H = exog.)	.828	.335	.629	.295	.786	.587	.617	.582	.848	.747	.949	.886

5.2 Employment growth

The effects on firms' employment growth are slightly different. Table 3 displays the general results. In contrast to the effects on the firms' balance sheets, we observe positive serial correlation both for small and large firms. For large firms, the effect is even stronger - both statistically and economically. Company age has a similarly significant effect on both types of firms: the older the firm, the higher its employment growth, while extremely high age leads to decreasing growth rates. The inherent forces driving employment growth hence appear relatively similar for SMEs as for large companies.

A very interesting observation can be made with respect to the impact that the business cycle exerts on employment growth. While the current level of GDP still has a weakly significant, positive effect on SMEs' growth rates, it has a significantly negative impact on large firms' employment growth. The lagged GDP-level, in contrast, lets large firms' employment levels increase. Hence, large companies obviously react slowly, almost anti-cyclically to the macroeconomic environment by adjusting their number of employees only after several months. This is also mirrored by the negative impact of the GDP growth rate on large firms' employment growth, while SMEs' growth rates react positively. These observations also coincide with the casual inspection of Figure 3, where we noticed that large firms' employment growth seems to lag behind GDP growth. Note also that the coefficients of the GDP growth rate in the SME models are much smaller than for balance sheet growth as reported in Table 2. Hence, the development of SMEs' workforce appears to follow the business cycle in a much smoother way than the size of their balance sheet.

Similarly to balance sheet growth, total sales exert a positive effect with regard to large firms' employment growth rates, but there is no impact on SMEs. It may hence be the case that large firms need internally generated means of capital to finance an increase in the workforce, while smaller firms do not. Alternatively, total sales could again be interpreted as a proxy for size so that large firms simply increase their workforce along with their size.

Table 3: Effects on total employment growth

System GMM regression on the difference of the current and last year's total employment in logs ($\Delta \text{LogSIZEte}$). SIZEte is total employment, L. refers to the one-period lag of the respective variable, LogAGE is the logarithm of company age, LogAGE2 the squared logarithm of company age, GDPGR is the GDP growth rate, NUMBSH the number of shareholders, PROF the profitability measured as net income divided by total sales, ER the equity ratio and LEV the leverage ratio. The lagged dependent variable, LogSALES, PROF, ER and LEV are instrumented. Industry dummies and region dummies are always included, but results are not displayed. ***, **, and * indicate significance at the 1%, 5%, and 10% level. p-values are given in parenthesis.

Variable	(I)		(II)		(III)		(IV)		(V)		(VI)	
	SME	Large	SME	Large	SME	Large	SME	Large	SME	Large	SME	Large
Constant	-.0080 (.988)	-1.2531*** (.001)	-.1105 (.631)	-.9317*** (.004)	-.0862 (.877)	-1.2794*** (.000)	-.2084 (.423)	-.8474*** (.001)	.0030 (.996)	-1.2073*** (.001)	-.1271 (.604)	-.8557*** (.006)
L.Delta Log L.SIZEte	.1288* (.067)	.3443** (.012)	.1257* (.070)	.3356** (.017)	.1182* (.074)	.3341*** (.008)	.1172* (.072)	.3194** (.012)	.1172* (.061)	.3519*** (.008)	.1155* (.060)	.3432*** (.010)
LogAGE	.0983** (.038)	.0970* (.082)	.1000** (.034)	.1001* (.074)	.1089** (.028)	.0830* (.091)	.1104** (.024)	.0888* (.080)	.1033** (.031)	.0932* (.073)	.1042** (.029)	.0963* (.066)
logAGE2	-.0139** (.040)	-.0133* (.100)	-.0141** (.035)	-.0137* (.095)	-.0152** (.031)	-.0103 (.142)	-.0154** (.027)	-.0111 (.129)	-.0145** (.035)	-.0129* (.090)	-.0146** (.032)	-.0133* (.085)
GDP	$7.14e^{-7}$ * (.060)	$-4.22e^{-7}$ **			$6.98e^{-7}$ *	$-4.26e^{-7}$ **			$6.89e^{-7}$ *	$-4.13e^{-7}$ **		
L.GDP	$-7.54e^{-7}$ (.155)	$5.94e^{-7}$ ** (.049)			$-7.48e^{-7}$ (.159)	$6.68e^{-7}$ ** (.032)			$-7.48e^{-7}$ (.160)	$5.99e^{-7}$ * (.048)		
GDPGR			.9327* (.056)	-.4219* (.087)			.8988* (.062)	-.3365 (.155)			.9117* (.071)	-.3884* (.089)
LogSALES	-.0149 (.534)	.0559*** (.009)	-.0122 (.606)	.0582*** (.007)	-.0089 (.713)	.0384** (.018)	-.0063 (.792)	.0433** (.015)	-.0121 (.638)	.0507*** (.010)	-.0107 (.675)	.0528*** (.009)
LEGAL	-.0067 (.846)	-.0170 (.430)	-.0052 (.881)	-.0178 (.419)	-.0062 (.858)	-.0212 (.294)	-.0047 (.894)	-.0227 (.280)	-.0100 (.770)	-.0155 (.432)	-.0091 (.791)	-.0160 (.429)
PUBLIC	-.0340 (.378)	.0305 (.234)	-.0319 (.409)	.0312 (.238)	-.0292 (.456)	-.0247 (.305)	-.0272 (.490)	-.0220 (.372)	-.0260 (.509)	.0282 (.227)	-.0251 (.526)	.0288 (.232)
NUMBSH	-.0002 (.846)	-.0031* (.054)	-.0002 (.860)	-.0032** (.046)	-.0003 (.803)	-.0018 (.117)	-.0002 (.816)	-.0021* (.086)	-.0003 (.812)	-.0027* (.064)	-.0002 (.821)	-.0029* (.056)
TYPSH	-.0020 (.932)	.0581** (.034)	-.0013 (.955)	.0599** (.032)	-.0020 (.935)	.0473** (.015)	-.0013 (.958)	.0509** (.011)	.0125 (.578)	.0545** (.032)	.0130 (.560)	.0561** (.030)
PROF	.0007*** (.010)	-.2015* (.074)	.0007*** (.008)	-.2030* (.072)	.0006** (.023)	-.2753** (.021)	.0006** (.021)	-.2728** (.021)	.0007** (.011)	-.1953* (.080)	.0007** (.011)	-.1963* (.079)
ER					.0513 (.612)	.3471*** (.003)	.0500 (.622)	.3385*** (.005)				
LEV									-.0034 (.601)	-.0002 (.931)	-.0034 (.602)	.0002 (.926)
No. of observations	587	525	587	525	587	525	587	525	578	525	578	525
F	2.73	2.76	3.20	2.00	2.86	4.08	3.41	2.92	2.43	2.83	2.71	2.17
Prob > F	.002	.003	.001	.035	.001	.000	.000	.002	.006	.002	.003	.018
Sargan Prob > χ^2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Hansen Prob > χ^2	.219	.452	.451	.318	.400	.339	.673	.372	.565	.296	.649	.263
Arellano-Bond for AR(1) in 1st diff.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Arellano-Bond for AR(2) in 1st diff.	.746	.357	.697	.346	.715	.298	.500	.284	.962	.353	.908	.339
gmm instr. - Hansen excl. group	.659	.149	.730	.197	.808	.181	.866	.238	.536	.184	.620	.283
gmm instr. - Diff. (null H = exog.)	.090	.794	.241	.521	.155	.580	.195	.549	.519	.506	.560	.334
iv - Hansen excl. group	.658	.522	.692	.321	.481	.295	.554	.274	.615	.467	.710	.442
iv - Diff. (null H = exog.)	.034	.329	.145	.382	.281	.501	.339	.659	.368	.145	.351	.119

Neither the legal, nor the public, industry or region dummy affect employment growth, which is in contrast to Harhoff et al. (1998).

However, the number of shareholders still has a weakly significant negative effect on large firm's employment growth, similarly to the impact on total assets. Again, there is no effect for small firms. For the type of largest shareholder, we observe a significantly positive influence for large firms but no impact for small firms. Hence, a large number of shareholders appears to reduce large firms' employment growth; but if the largest shareholder is an individual or a family, this has a beneficial effect on employment. For small companies, in contrast, the governance of the firm seems not to have any impact on employment.

Inspection of the profitability measure delivers further interesting results. Both small and large firms' employment growth appears to be affected by profitability, but in opposite directions. While small firms seem to raise the number of employees if profitability increases, large firms do the opposite. Note that the system GMM estimation method takes into account the problem of causality between profitability and employment. More profitable large firms hence truly seem to use their higher profitability in order to reduce employment rather than the other way round, i.e. cut employment in order to boost profitability.

The capital structure also exerts a different impact on employment growth than on balance sheet growth: for large firms we observe that higher equity ratios go along with higher employment. We do not find an effect on SMEs and no effect whatsoever from leverage.

5.3 Discussion

Comparing our results so far we find that firms indeed appear to choose different growth strategies (or be affected by different exogenous growth factors) depending on their size. Additionally, measuring growth via the size of the balance sheet delivers different results than approximating growth via the development of the firm's workforce ⁵.

Judging from the balance sheet, there is only weak indication that small firms truly foster growth in order to turn into "large" companies quickly. While we observe a positive serial correlation in the growth process for SMEs, the size of this effect is rather small. At the same time, we do not find that young firms grow any stronger than older firms as there is no significant effect of firm age on SMEs growth rate. However, large firms display the expected concave growth process: extremely old firms indeed show smaller growth. Yet, even the large firms in our sample still do grow. Overall, we conclude from our analysis that small firms' balance sheet growth appears to be largely determined by

⁵This is also underlined by our analysis applying changes in total sales as growth measure which delivers further divergent results.

the business cycle, i.e. GDP growth rate, while large firms tend to follow an inherent - concave - growth path. The capital structure, in contrast, appears to play no role for balance sheet growth. Interesting further effects stem from the firms' corporate governance structure. They run into opposite directions for large firms vis-à-vis SMEs. Also there seem to be differences in the extent to which firms use their profitability in order to boost growth: large firms use this growth factor much more aggressively than smaller companies.

Judging from employment growth, in contrast, it appears that small and large firms follow a very similar inherent growth process that displays a weak positive serial correlation that flattens out with increasing age. The dependence on the business cycle is much smaller for SMEs as compared to balance sheet growth, while large firms even seem to counteract the business cycle by increasing employment in economic downturns and vice versa. While the corporate governance effects are not as strong and no longer opposing when analyzing employment growth, the impact of profitability on this growth variable is even more diverging than for the case of balance sheet growth. Large firms actively reduce their employment via increases in profitability. The capital structure also takes on a more active role when employment growth is analyzed.

What emerges from our analysis so far is that two growth channels deserve further investigation: the firms' capital structure and corporate governance. It may well be the case that the variables considered so far exert complex effects that cannot be detected by simply looking at the "average" impact. It may well be conceivable, e.g., that the equity ratio has a different effect on growth for older firms than for younger firms, or for firms of varying profitability. Similarly, there may be interdependencies between the various governance variables. For instance, there may be widely diverging growth effects between privately held firms with only few shareholders as compared to publicly held firms with few shareholders. These interrelated effects will be considered next.

6 Specific effects

6.1 Capital structure effects

The fact that the capital structure did not yet show a significant impact on firm growth does not necessarily imply that there is no effect. Rather, there may be complex influences that require to look at the capital structure variables in a more refined way. It may for instance be well conceivable that older firms are able to reduce information asymmetries and, hence, make use of external financing more cheaply in order to foster growth. We therefore interact the capital structure variables with the company age. Also, there may be general size or profitability effects that impact the use of specific forms of capital. This leads us to build interactions with the size variable and the profitability variable

as well. The respective results with regard to balance sheet growth are given in Table 4.

As can be seen, the refined analysis of the capital structure does indeed show significant results. Regarding SMEs, we find that there is a positive influence of the equity ratio, which is, however, reduced by the firms' size as measured by total assets. Hence, the larger a firm becomes, the lower is the positive impact that its equity ratio has on balance sheet growth. Interestingly, we also find a significant interaction of the equity ratio's effect on growth with the profitability measure. While according to Table 2, profitability on average has a positive effect on SMEs' balance sheet growth, this impact seems to be largely driven by those SMEs with high equity: in regression models IIIa and IVa, the profitability variable displays a significantly negative coefficient while the interaction term with the equity ratio strongly reduces this negative effect via the comparably large and highly significant coefficient. This channel is also mirrored by regressions Va and VIa where the profitability variable is interacted with the leverage ratio. In these regressions, the profitability regressor keeps its positive sign, but the interaction takes on a significantly negative coefficient: hence, the growth-enhancing effect of SMEs' profitability is reduced by high levels of debt vis-à-vis equity. It seems to be the case that small firms not necessarily use an increase in profitability to boost balance sheet growth. Rather, it is the SMEs with high equity ratios that do so.

For large firms, we observe a slightly different effect of the capital structure on firm growth. While, similarly as for SMEs, the equity ratio's positive impact is reduced by firm size, it is additionally reduced by firm age. This, again, explains why we did not observe an effect of the equity ratio in the general test reported in Table 2. Only for the smaller and younger firms among the subsample of large firms does the equity ratio increase balance sheet growth. For the extremely old and large companies, in contrast, an increasing equity ratio may even reduce growth. We also find a positive impact of debt financing via a weakly significant leverage regressor. Again, its impact is reduced by firm size. We may therefore conclude that for large firms, the capital structure is less decisive for balance sheet growth than for small firms. Contrary to the above conjecture, we do not observe a significant interaction of the leverage ratio with firm age. It may well be the case, that the large firms in our sample have already an age where there is no further reduction in information asymmetry between the lenders and the borrowing firms.

As regards the effects of the capital structure on employment growth, weaker results are obtained as displayed in Table 5. Similarly to balance sheet growth, we find a negative interrelation between the effects that profitability and the equity ratio exert on SMEs' employment growth. There is, however, no significant interrelation between firm size and equity ratio. For large firms, we observe a significant positive influence of the equity ratio on employment growth that is reduced by firm size and profitability, though. Hence, the negative interrelation between the effects of equity and profitability now shows up

Table 4: Effects on total assets growth with capital-structure interaction terms

System GMM regression on the difference of the current and last year's total assets in logs ($\Delta \text{LogSIZEta}$). SIZEta is total assets, L. refers to the one-period lag of the respective variable. LogAGE is the logarithm of company age, LogAGE2 the squared logarithm of company age, GDPGR is the GDP growth rate, NUMBSH the number of shareholders, PROF the profitability measured as net income divided by total sales, ER the equity ratio and LEV the leverage ratio. The lagged dependent variable, LogSALES, PROF, ER and LEV are instrumented. Industry dummies and region dummies are always included, but results are not displayed. ***, **, and * indicate significance at the 1%, 5%, and 10% level. p-values are given in parenthesis.

Variable	(IIIa)		(IVa)		(Va)		(VIa)	
	SME	Large	SME	Large	SME	Large	SME	Large
Constant	-.8219 (.241)	-1.2937*** (.006)	-.4204 (.167)	-1.5407*** (.000)	-.4175 (.532)	-1.1269** (.012)	-.2482 (.302)	-1.3916*** (.000)
L.Delta Log L.SIZEta	.1692*** (.004)	.0846 (.305)	.1725*** (.004)	.0860 (.295)	.0980 (.147)	.0880 (.326)	.0987 (.144)	.0907 (.313)
LogAGE	.0789 (.296)	.1072* (.076)	.0883 (.247)	.1042* (.076)	.0227 (.754)	.1172* (.080)	.0302 (.685)	.1155* (.078)
LogAGE2	-.0015 (.892)	.0027 (.763)	-.0029 (.801)	-.0023 (.794)	-.0013 (.906)	-.0154* (.096)	-.0024 (.833)	-.0152* (.094)
GDP	$7.92e^{-7}$ * (.090)	$1.52e^{-7}$ (.536)			$9.33e^{-7}$ * (.051)	$1.45e^{-7}$ (.571)		
L.GDP	$-5.85e^{-7}$ (.415)	$-2.72e^{-7}$ (.467)			$-8.40e^{-7}$ (.243)	$-2.79e^{-7}$ (.458)		
GDPGR			1.0634** (.017)	.0186 (.950)			1.1875** (.012)	-.0511 (.875)
LogSALES	.0037 (.859)	.1031*** (.000)	.0062 (.774)	.1031*** (.000)	.0128 (.520)	.0940*** (.000)	.0158 (.431)	.0933*** (.000)
LEGAL	-.0173 (.700)	-.0421 (.162)	-.0151 (.741)	-.0417 (.165)	-.0327 (.257)	-.0277 (.363)	-.0310 (.295)	-.0274 (.364)
PUBLIC	-.0428 (.396)	.0821* (.083)	-.0411 (.424)	.0807* (.086)	.0030 (.925)	.0566* (.067)	.0061 (.851)	.0567* (.066)
NUMBSH	.0068*** (.003)	-.0039** (.040)	.0070*** (.003)	-.0038** (.043)	.0028*** (.007)	-.0043*** (.003)	.0028*** (.006)	-.0042*** (.004)
TYP SH	.0346 (.313)	.0567 (.143)	.0351 (.314)	.0553 (.149)	.0630* (.056)	.0630 (.141)	.0649* (.052)	.0622 (.143)
PROF	-.0025*** (.002)	.0891 (.666)	-.0026*** (.001)	.0908 (.660)	.0021*** (.000)	.0728 (.692)	.0021*** (.000)	.0700 (.706)
ER	1.4409** (.024)	2.0063*** (.007)	1.4932** (.024)	2.0501*** (.005)				
ER x logAGE	-.0549 (.436)	-.2343** (.018)	-.0520 (.460)	-.2342** (.019)				
ER x L.logSIZEta	-.1189** (.037)	-.1121** (.019)	-.1239** (.037)	-.1150** (.014)				
ER x PROF	.0062*** (.001)	.5483 (.277)	.0064*** (.001)	.5397 (.288)				
LEV					.0086 (.903)	.2329* (.053)	.0078 (.914)	.2337* (.052)
LEV x logAGE					.0084* (.094)	-.0036 (.551)	.0086* (.091)	-.0034 (.568)
LEV x L.logSIZEta					-.0045 (.463)	-.0170** (.035)	-.0045 (.470)	-.0171** (.034)
LEV x PROF					-.0011*** (.000)	.1183 (.271)	-.0012*** (.000)	.1193 (.270)
No. of observations	674	556	674	525	665	556	665	556
F	8.05	2.94	5.93	3.16	11.67	3.69	11.83	3.71
Prob > F	.000	.001	.000	.000	.000	.000	.000	.000
Sargan Prob > χ^2	.000	.000	.000	.000	.000	.000	.000	.000
Hansen Prob > χ^2	.476	.872	.375	.836	.297	.813	.378	.777
Arell.-Bond for AR(1) in 1st diff.	.000	.000	.000	.000	.000	.000	.000	.000
Arell.-Bond for AR(2) in 1st diff.	.971	.143	.980	.140	.799	.129	.785	.127
gmm instr. - Hansen excl. group	.748	.140	.693	.123	.486	.327	.560	.528
gmm instr. - Diff. (null H = exog.)	.256	.998	.196	.997	.234	.948	.278	.814
iv - Hansen excl. group	.413	.599	.366	.590	.440	.652	.509	.659
iv - Diff. (null H = exog.)	.620	1.000	.445	1.000	.124	.960	.149	.880

for large firms' employment growth, too. Again, the negative effect of the profitability variable on employment growth that we observed in the general test of Table 3 seems to stem from those firms with sufficiently high equity ratios. For the leverage, in contrast, we observe hardly any significant results.

6.2 Corporate governance effects

It is quite striking to note from Tables 2 and 3 that both the corporate governance variables and the profitability measure show such different influences on SMEs and large firms, both for balance sheet growth and employment growth. In order to dig deeper into these aspects, we run additional regressions where we take the interaction between the public dummy and the number of shareholders, the type of shareholder, as well as the profitability variable into account. Tables 6 and 7 display the results for balance sheet growth and employment growth, respectively.

As regards the effects on balance sheet growth, we can see from model (A) that SMEs are indeed positively affected by the number of shareholders, but only if the firm is privately held, since the interaction term of the number of shareholders with the public dummy does not show a significant effect, but the number of shareholders itself (i.e. in the remaining subgroup of privately-held firms) does. This refines our earlier, general result that the number of shareholders increases SMEs' asset growth. For large firms, in contrast, we do not observe a differential effect of the number of owners in privately-held vs. publicly-listed firms.

Interestingly, the distinction between private and public ownership does not influence the effect that the type of largest owner has. While in the general model we found that an individual or family as largest shareholder increases growth for both SMEs and large firms, this effect is irrespective of the public or private nature of this ownership as can be seen from model (B).

Finally, we observe from model (C) that the profitability variable increases balance sheet growth in large firms only if these firms are privately held. The interaction term of the profitability measure with the public dummy displays a highly significant negative coefficient, while the profitability in privately-held firms exerts a highly significant positive effect on firm growth. For small firms, we do not obtain any significant individual profitability effects, in contrast.

Table 7 displays the results for employment growth. Even more strongly than for balance sheet growth, we find that in privately-held SMEs the number of employees grows strongly with the number of shareholders while for publicly-listed SMEs the workforce decreases in the number of shareholders. This particular combination of governance variables seems to be extremely important for SMEs growth processes, as can also be seen from the large F-value of this regression. For large firms, we do not observe any similar effects, nor for the interrelation of the type of largest shareholder with the public dummy.

Table 5: Effects on employment growth with capital-structure interaction terms

System GMM regression on the difference of the current and last year's total employment in logs ($\Delta \text{LogSIZE}_{t}$). SIZE_{t} is total employment, L. refers to the one-period lag of the respective variable. LogAGE is the logarithm of company age, LogAGE^2 the squared logarithm of company age, GDPGR is the GDP growth rate, NUMBSH the number of shareholders, PROF the profitability measured as net income divided by total sales, ER the equity ratio and LEV the leverage ratio. The lagged dependent variable, LogSALES , PROF , ER and LEV are instrumented. Industry dummies and region dummies are always included, but results are not displayed. ***, **, and * indicate significance at the 1%, 5%, and 10% level. p-values are given in parenthesis.

Variable	(IIIa)		(IVa)		(Va)		(VIa)	
	SME	Large	SME	Large	SME	Large	SME	Large
Constant	-.2317 (.674)	-1.0187*** (.001)	-.2343 (.370)	-5.5809*** (.001)	-.2506 (.616)	-.9029*** (.007)	-.2056 (.289)	-.4468** (.028)
L.Delta Log L.SIZE _t	.1330** (.047)	.3327*** (.002)	.1329** (.046)	.3268*** (.002)	.0993 (.143)	.3824*** (.001)	.0995 (.143)	.3726*** (.002)
LogAGE	.0752 (.230)	.0523* (.071)	.0758 (.224)	.0545* (.059)	.0987* (.054)	.0448 (.195)	.1009** (.046)	.0496 (.167)
LogAGE ²	-.0140* (.054)	-.0059 (.124)	-.0144** (.045)	-.0063 (.101)	-.0144* (.057)	-.0068 (.142)	-.0147** (.048)	-.0073 (.128)
GDP	6.28e-7* (.091)	-4.06e-7** (.041)			6.17e-7 (.101)	-3.84e-7* (.056)		
L.GDP	-6.24e-7 (.236)	6.34e-7** (.034)			-5.97e-7 (.257)	6.22e-7** (.041)		
GDPGR			.8033* (.090)	-.3286 (.106)			.9480* (.053)	-.3072 (.138)
LogSALES	.0063 (.749)	.0263** (.018)	.0092 (.637)	.0290** (.012)	-.0012 (.954)	.0240** (.039)	-.0009 (.963)	.0260** (.034)
LEGAL	-.0015 (.964)	-.0162 (.275)	.0004 (.990)	-.0170 (.262)	-.0056 (.862)	-.0003 (.984)	-.0050 (.878)	.0008 (.958)
PUBLIC	-.0092 (.793)	.0014 (.931)	-.0066 (.851)	.0026 (.872)	-.0159 (.663)	.0181 (.164)	-.0159 (.665)	.0189 (.169)
NUMBSH	-.0002 (.833)	.0008 (.396)	-.0002 (.863)	.0007 (.469)	-.0002 (.875)	.0001 (.874)	-.0002 (.880)	.0001 (.899)
TYP SH	-.0003 (.990)	.0272** (.038)	.0004 (.987)	.0283** (.032)	.0165 (.454)	.0307** (.042)	.0167 (.452)	.0313** (.049)
PROF	.0017*** (.001)	.0680 (.580)	.0016*** (.001)	.0703 (.558)	.0001 (.647)	-.2977** (.040)	.0001 (.608)	-.3091** (.029)
ER	-.0971 (.777)	.9798*** (.000)	-.1132 (.739)	.9936*** (.000)				
ER x logAGE	.0481 (.475)	-.0264 (.473)	.0510 (.448)	-.0237 (.525)				
ER x L.logSIZE _t	-.0146 (.722)	-.0963*** (.001)	-.0163 (.687)	-.1001*** (.001)				
ER x PROF	-.0020** (.020)	-.5946* (.082)	-.0019** (.024)	-.5846* (.075)				
LEV					-.0184 (.444)	.1375 (.133)	-.0201 (.407)	.1548 (.112)
LEV x logAGE					.0039 (.953)	.0011 (.069)	.0040 (.917)	.0001 (.060)
LEV x L.logSIZE _t					.0002 (.953)	-.0190* (.069)	.0004 (.917)	-.0207* (.060)
LEV x PROF					.0005* (.073)	.0789 (.295)	.0005* (.078)	.0856 (.253)
No. of observations	587	525	587	525	578	525	578	525
F	10.44	4.35	13.20	3.92	15.68	4.44	15.08	2.79
Prob > F	.000	.000	.000	.000	.000	.000	.000	.001
Sargan Prob > Chi	.000	.000	.000	.000	.000	.000	.000	.000
Hansen Prob > Chi	.419	.905	.395	.838	.285	.812	.224	.777
Arell.-Bond for AR(1) in 1st diff.	.000	.000	.000	.000	.000	.000	.000	.000
Arell.-Bond for AR(2) in 1st diff.	.851	.392	.817	.354	.960	.250	.982	.215
gmm instr. - Hansen excl. group	.561	.084	.491	.049	.245	.045	.403	.196
gmm instr. - Diff. (null H = exog.)	.325	1.000	.346	1.000	.414	1.000	.198	.973
iv - Hansen excl. group	.331	.400	.377	.485	.198	.655	.277	.575
iv - Diff (null H = exog.)	.699	1.000	.475	1.000	.743	.953	.229	.993

Table 6: Effect on total assets growth including interaction terms with public dummy

System GMM regression on the difference of the current and last year's total assets in logs ($\Delta \text{LogSIZEta}$). SIZEta is total assets, L refers to the one-period lag of the respective variable. LogAGE is the logarithm of company age, LogAGE2 the squared logarithm of company age, GDPGR is the GDP growth rate, NUMBSH the number of shareholders, TYP SH is a dummy variable that takes on a value of 1 if the largest shareholder is an individual or a family and 0 otherwise. PROF the profitability measured as net income divided by total sales. The lagged dependent variable, LogSALES and PROF are instrumented. Industry and region dummies are included but results are not displayed. ***, **, and * indicate significance at the 1%, 5%, and 10% level. p-values are given in parenthesis.

Variable	(A)		(B)		(C)	
	SME	Large	SME	Large	SME	Large
Constant	-0.8746 (.223)	-1.0061** (.015)	-0.8806 (.219)	-1.0614** (.011)	-1.0346 (.131)	-1.0723** (.011)
L.Delta Log L.SIZEta	.1138 (.103)	.0585 (.529)	.1139 (.104)	.0633 (.501)	.1276* (.068)	.0674 (.502)
LogAGE	.0175 (.802)	.1145* (.083)	.0192 (.785)	.1258* (.055)	.0219 (.769)	.1124* (.089)
LogAGE2	.0008 (.944)	-.0156 (.108)	.0005 (.962)	-.0174* (.076)	.0001 (.990)	-.0152 (.120)
GDP	8.98e-7* (.062)	8.08e-8 (.755)	8.95e-7* (.062)	7.43e-8 (.775)	8.91e-7* (.061)	1.12e-7 (.664)
L.GDP	-6.00e-7 (.404)	-2.28e-7 (.540)	-5.98e-7 (.404)	-2.29e-7 (.541)	-6.09e-7 (.393)	-2.69e-7 (.470)
LogSALES	.0125 (.592)	.0902*** (.000)	.0135 (.560)	.0919*** (.000)	.0326 (.170)	.0926*** (.000)
LEGAL	-.0270 (.319)	-.0382 (.216)	-.0303 (.240)	-.0382 (.210)	-.0212 (.518)	-.0474 (.125)
PUBLIC	.0072 (.827)	.0403 (.388)	.0075 (.816)	.0514 (.116)	.0214 (.534)	.0831** (.015)
NUMBSH	.0047** (.012)	-.0123 (.242)	.0027** (.021)	-.0056*** (.002)	.0027** (.011)	-.0055*** (.003)
PUBLIC x NUMBSH	-.0021 (.364)	.0070 (.504)				
TYP SH	.0414 (.135)	.0833* (.066)	.0611 (.215)	.0046 (.954)	.0498* (.072)	.0855* (.053)
PUBLIC x TYP SH			-.0229 (.710)	.1079 (.258)		
PROF	.0009** (.033)	.2500* (.057)	.0009** (.033)	.2470* (.060)	-.0249 (.389)	.9292*** (.005)
PUBLIC x PROF					.0256 (.375)	-.7519** (.027)
No. of observations	674	556	674	556	674	556
F	10.14	3.36	7.77	3.78	6.31	4.15
Prob > F	.000	.000	.000	.000	.000	.000
Sargan Prob > Chi^2	.000	.000	.000	.000	.000	.000
Hansen Prob > Chi^2	.660	.509	.642	.496	.581	.701
Arellano-Bond for AR(1) in 1st diff.	.000	.000	.000	.000	.000	.000
Arellano-Bond for AR(2) in 1st diff.	.522	.100	.520	.094	.528	.122
gmm instr. - Hansen test excl. group	.438	.802	.438	.841	.600	.845
gmm instr. - Diff. (null H = exogenous)	.726	.247	.702	.211	.486	.419
iv - Hansen test excl. group	.396	.578	.572	.547	.650	.551
iv - Diff. (null H = exogenous)	.884	.353	.594	.374	.348	.788

Table 7: Effect on total employment growth including interaction terms with public dummy

System GMM regression on the difference of the current and last year's total employment in logs ($\Delta \text{LogSIZE}_{t}$). SIZE_{t} is total employment, L. refers to the one-period lag of the respective variable. LogAGE is the logarithm of company age, LogAGE^2 the squared logarithm of company age, GDPGR is the GDP growth rate, NUMBSH the number of shareholders, TYP SH is a dummy variable that takes on a value of 1 if the largest shareholder is an individual or a family and 0 otherwise. PROF the profitability measured as net income divided by total sales. The lagged dependent variable, LogSALES and PROF are instrumented. Industry and region dummies are included but results are not displayed. ***, **, and * indicate significance at the 1%, 5%, and 10% level. p-values are given in parenthesis.

Variable	(A)		(B)		(C)	
	SME	Large	SME	Large	SME	Large
Constant	-.0444 (.935)	-1.2577*** (.001)	.0020 (.997)	-1.2529*** (.001)	-.0941 (.856)	-1.1990*** (.001)
L.Delta Log L.SIZE _t	.1316* (.061)	.3437** (.012)	.1281* (.068)	.3489** (.012)	.1265* (.078)	.3570*** (.009)
LogAGE	.0986** (.027)	.0990* (.073)	.1032** (.027)	.0977* (.084)	.0982** (.039)	.0982* (.060)
LogAGE ²	-.0143** (.026)	-.0136* (.092)	-.0148** (.028)	-.0136 (.101)	-.0139** (.042)	-.0136* (.074)
GDP	$7.39e^{-7}$ * (.054)	$-4.23e^{-7}$ **	$7.09e^{-7}$ *	$-4.23e^{-7}$ **	$6.75e^{-7}$ *	$-4.29e^{-7}$ **
L.GDP	$-7.70e^{-7}$ (.148)	$5.93e^{-7}$ ** (.050)	$-7.56e^{-7}$ (.155)	$5.99e^{-7}$ ** (.048)	$-6.81e^{-7}$ (.192)	$6.24e^{-7}$ ** (.044)
LogSALES	-.0163 (.503)	.0554*** (.010)	-.0152 (.527)	.0553*** (.010)	-.0132 (.536)	.0490*** (.008)
LEGAL	.0054 (.861)	-.0172 (.422)	-.0136 (.692)	-.0164 (.440)	-.0075 (.821)	-.0100 (.625)
PUBLIC	.0007 (.985)	.0375 (.233)	-.0183 (.664)	.0259 (.321)	-.0305 (.387)	.0160 (.499)
NUMBSH	.0115*** (.000)	-.0006 (.903)	-.0003 (.753)	-.0030* (.057)	-.0002 (.854)	-.0027* (.052)
PUBLIC x NUMBSH	-.0124*** (.000)	-.0025 (.584)				
TYP SH	-.0168 (.431)	.0580** (.032)	.0466 (.342)	.0237 (.502)	-.0014 (.951)	.0540** (.031)
PUBLIC x TYP SH			-.0646 (.232)	.0456 (.372)		
PROF	.0008*** (.010)	-.2009* (.074)	.0007*** (.009)	-.2004* (.073)	.0252*** (.008)	-.5798** (.044)
PUBLIC x PROF					-.0245*** (.009)	.3973 (.204)
No. of observations	587	525	587	525	587	525
F	6.68	2.62	2.74	2.58	3.99	2.97
Prob > F	.000	.003	.002	.004	.000	.001
Sargan Prob > χ^2	.000	.000	.000	.000	.001	.000
Hansen Prob > χ^2	.224	.445	.216	.457	.402	.397
Arellano-Bond for AR(1) in 1st diff.	.000	.000	.000	.000	.000	.000
Arellano-Bond for AR(2) in 1st diff.	.752	.357	.744	.352	.733	.225
gmm instr. - Hansen test excl. group	.615	.149	.661	.147	.842	.142
gmm instr. - Diff. (null H = exogenous)	.105	.784	.087	.802	.139	.731
iv - Hansen test excl. group	.588	.462	.658	.539	.765	.329
iv - Diff. (null H = exogenous)	.058	.402	.038	.322	.051	.565

As regards the interrelation between the profitability variable and the public dummy, we observe fully contrasting results than in the case of balance sheet growth. For large firms, a higher profitability reduces employment growth but only if these firms are privately held, not for publicly-listed ones. We also find significant effects for SMEs: the generally positive impact of profitability on employment growth as reported in Table 3 is shown to be solely triggered by privately-held SMEs. Publicly-listed SMEs, in contrast, reduce their employment with improving profitability. This latter finding suggests that the distinction between SMEs and large firms may be incomplete without the additional information on the private or public nature of ownership.

7 Conclusion

Our analysis of small and large firms' growth rates delivers two general results: first, the group of SMEs contains firms with strongly diverging characteristics so that judgment from the "average" SME very often does not capture the underlying, more complex effects. Second, the distinction between smaller firms on the one hand and larger ones on the other does not necessarily coincide with the distinction between young and old companies nor with the differentiation between growing and saturated firms. Rather, combining the characterization according to a firm's size with its nature of ownership (private or public) seems to deliver a much more concise picture.

More specifically, our growth analysis showed that not only small firms but also large firms intend to foster growth. Interestingly, we find that the equity ratio fosters balance sheet growth only for the lower size brackets and only for the younger firms. SMEs' balance sheet growth is furthermore strongly dependent on the business cycle, while large firms' growth appears to be positively driven by their size. Employment growth as our second measure of the firms' growth development seems to be a more stable process, both for SMEs and for large firms. The latter even tend to change their workforce anticyclically with respect to GDP growth. The equity ratio plays a role only for large firms' employment growth but not for SMEs. Interestingly, we find that profitability has different effects on SMEs' and large firms' growth and is moreover dependent on the public / private nature of their ownership: While privately-held SMEs increase their workforce with rising profitability, publicly-listed SMEs reduce it. For large firms we observe the opposite effect.

To summarize, we find that SMEs cannot be characterized as "little giants" that attempt to grow fiercely in order to turn into large firms as quickly as possible. Rather, it seems to be the case that those SMEs that intend to grow are able to choose appropriate means, for instance by avoiding to be publicly-listed with a large number of shareholders. For truly small companies, a high equity ratio is also conducive to the growth process. As such, the notion of "small" firms does not necessarily coincide

with the notion of “growing” firms, but for privately-and tightly-held small firms this conjecture seems to be much more appropriate.

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Appendix

Table 8: Type of Industry

Industry	SME		Large	
	#	%	#	%
Building and construction	4	3.7	0	0
Education	1	0.9	0	0.0
Coal mining	0	0.0	1	1.2
Power supplies	15	13.9	22	26.2
Financial services	7	6.5	0	0.0
Scientific and engineering service	24	22.2	4	4.8
Hotel and restaurant industry	1	0.9	0	0.0
Other services	3	2.8	2	2.4
Real Estate	10	9.3	0	0.0
Trade	5	4.6	6	7.1
Information and communication	11	10.2	2	2.4
Manufacturing trade	15	13.9	35	41.7
Transportation and logistics	9	8.3	8	9.5
Water supply	2	1.9	3	3.6
Civil Service	1	0.9	0	0.0
Health Care	0	0.0	1	1.2
Total	108	100.0	84	100.0

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