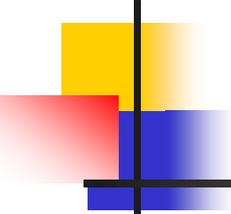# ON THE GROWTH OF MICRO, SMALL AND MEDIUM SIZED FIRMS IN CENTRAL AND EASTERN EUROPE: A DYNAMIC PANEL ANALYSIS

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Motivation:

- The empirical research has suggested that firm growth is determined by both:

- (1) the traditional characteristics of size and age, and
- (2) other firm-specific factors such as indebtedness, internal financing, future growth opportunities, process and product innovation, and organisational changes.

- An increasing body of literature indicates that small and medium sized enterprises (SMEs) are of major importance for macroeconomic growth.

- Limited empirical evidence has been provided so far on which of these determining factors are associated with SMEs growth and performance in transition economies.
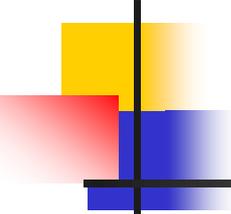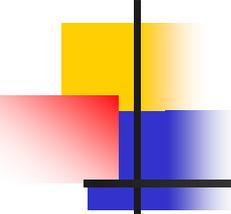
Previous research examined:

(1) The impact of financial constraints on investment decisions and firm growth :

- *Oliveira and Fortunato* (2006) find that small firms face greater financial constraints and that these have a negative impact on their growth.

- *Audretsch and Elston* (2002) also show that medium sized firms face greater financial constraints than large firms.

- *Birks and Ennew* (1996) assert that younger firms are more financially constrained than older ones.

- *Müeller and Zimmermann* (2008) also observe that SMEs face additional disadvantages.

- *Sarno (2008)* finds that access to financial markets and provision of external resources are more problematic for small firms.
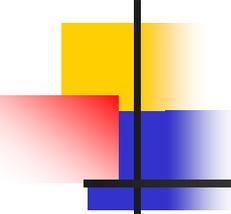
Previous research (...)

(2) How the mix between internal and external funds is linked with firm real performance and growth:

- Financial constraints and pecking order hypotheses (Almeida *et al.* 2004; Faulkender and Petesen 2006; Pàl and Ferrando 2006).

- Trade-off theory put forward by Acharya *et al.* (2005).

- Corporate finance literature and the agency cost problems (Jensen, 1986).

- A different approach suggests that financial constraints may also explain the relation between firm size and growth (Carpenter and Petersen, 2002, Elston, 2002, Wagenvoort, 2003, Fagiolo and Luzzi, 2004, Hutchinson and Xavier, 2006)

Previous research (...)

(3) Firm size and age as traditional determinants of growth:

- A negative relation between age and growth was predicted by Jovanovic's (1982) model, and revealed in a number of empirical studies and in different country contexts (see Evans, 1987b and Dunne et al., 1989 for US; Dunne and Hughes, 1994 for UK; Hamshad, 1994 for France; Farinas and Moreno, 2000 for Spain; Becchetti and Trovato, 2002 for Italy; Nurmi, 2003 for Finland).
- Exceptions are provided by Das (1995) and Elston (2002); both studies found a positive effect of firm age on a firm's growth.
- Wagenvoort (2003) estimates based on Carpenter and Petersen's (2002) model that growth to cash flow sensitivity of SMEs is broadly similar across EU countries.
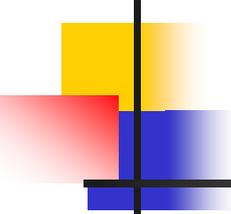
Previous research (...)

(4) The relationship between the entrepreneurial orientation (EO) of the firm and its performance:

- *Wiklund, Patzel, & Shepherd (2009)* claim that entrepreneurial orientation of a company is essential for the flexibility and quick decision making of a small company.
- *Moreno, & Casillas (2008)* find that EO and growth are positively related, although their relationship is more complex.
- *Freel, & Robson (2004)* find a positive relationship between novel product innovation and growth in employment and, for manufacturing firms, a negative relationship between product innovation and growth in sales or productivity.
- *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.
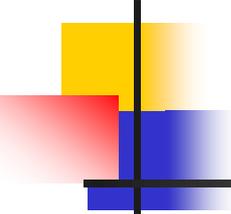
Research questions:

- This study aims to fill in the gap in the current debate on the determinants of SMEs growth in Central and Eastern Europe.

(1) We explore the question whether and to what extent the growth in SMEs in transition economies can be explained by both traditional and firm-specific characteristics.

(2) A second question we address in this paper is whether the growth and performance of fast-growing SMEs is determined by the same firm-specific characteristics as slow-growing SMEs.

(3) Finally, we argue that size and age sensitivity of growth is significantly different for SMEs that grow faster compared to firms that grow slower.
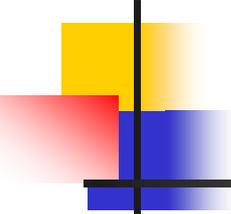
Data set and Methodology:

1. We examine data from <u>seven</u> transition economies (out of 13 countries): Bulgaria, Croatia, Czech Republic, Poland, Romania, Serbia and Slovakia (see Table 1).

- Number of firms: 4,561 SMEs
- Data period: 2001 – 2005
- In total: 22,805 observations
- Balanced panel data.

2. Two sub-samples: fast-growing (3,280) and slow-growing SMEs (1,281).

3. Eurostat and OECD <u>definition</u> of high-growth enterprises (HGEs): at least 20% annual employment growth on average over the last three years but instead of employment growth we used growth in sales revenues.

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

|	Bulgaria	Croatia	Czech Republic	Poland	Romania	Serbia	Slovakia	Total
Size (as of 2005)								
Micro (< 10 employees)	5	25	28	21	15	3	15	112
Small (< 50 employees)	31	162	130	179	113	27	27	669
Medium (< 250 employees)	108	431	1009	924	933	275	100	3,780
Total:	**144**	**618**	**1,167**	**1,124**	**1,061**	**305**	**142**	**4,561**
Age								
< 5 years	0	7	0	20	46	5	2	80
5 - 10 years	41	139	186	261	346	20	38	1,031
10 - 20 years	84	324	932	542	669	162	95	2,808
> 20 years	19	148	49	301	0	118	7	642
Total:	**144**	**618**	**1,167**	**1,124**	**1,061**	**305**	**142**	**4,561**
Sector								
Agriculture, Fishing& Mining	0	22	108	15	4	23	4	176
Construction	14	67	69	76	128	33	7	394
Financial Intermediation	4	8	16	20	0	0	5	53
Hotels and Restaurants	1	25	11	2	12	3	0	54
Manufacturing	32	137	462	365	438	114	49	1,597
Public Administration, Education, Health and Social Work	1	2	20	17	2	4	2	48
Real Estate, Renting and Business Activities	22	47	96	198	76	18	18	475
Transport, Storage and Communication	7	28	47	41	61	14	3	201
Utilities	1	21	42	47	11	19	3	144
Wholesale and Retail Trade	53	250	275	320	290	62	48	1,298
Other	9	11	21	23	39	15	3	121
Total:	**144**	**618**	**1,167**	**1,124**	**1061**	**305**	**142**	**4,561**
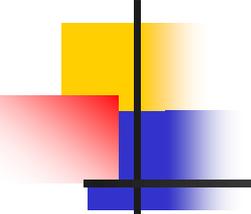
Dependant variable:

1. There is little agreement in the existing literature on how to measure growth, and scholars have used a variety of different measures.

- For example: growth of sales, employees, assets, profit, equity, and others (see Davidsson, & Wiklund, 2000).

- Following Heshmati (2001) we use *three growth models* – with growth in sales revenues, employment and total assets as dependant variable.
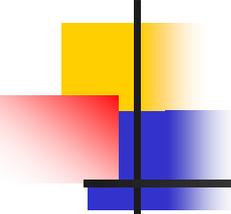
Explanatory variables:

2.   The choice of explanatory variables is theoretically driven and aims to proxy for firm specific characteristics that are likely to determine the growth of a firm (see Table 2):

(1) Traditional determinants of age and size.

(2) Macroeconomic variables: GDP per capita, inflation and corporate tax rate.

(3) Firm specific characteristics: internal finance, capital structure, liquidity, factor productivity, future growth opportunities.

Table 2: Dependent and explanatory variables

Variable	Definition	Explanation	Expected Sign
Dependant Variables			
GROWTH(Revenues)	Growth in Operating Revenues, (in per cent)	Log difference of firm's revenues in periods t and $t - 1$	
GROWTH(Assets)	Growth in Total Assets, (in per cent)	Log difference of firm's total assets in periods t and $t - 1$	
Explanatory variables			
Macroeconomic variables			
INFL	Inflation, proxy for the level of future real activity (in percent)	Percentage change the Consumer Price Index in period t	+
RGDP_G	Real GDP per capita, proxy for the level of economic activity (in percent)	Growth rate of real GDP per capita in period t	+
TAX_RATE	Statutory tax rate, proxy for tax burden on business (in percent)	Statutory corporate income tax rate in period t	-
Firm-specific variables			
TOT_ASSETS	Total Assets, proxy for firm size (in Euro, thousands)	Log difference of firm's total assets 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	-
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 Ratio, 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 $t - 1$	+
CF_RATIO	(Net Profit + Depreciation)/Total Assets, proxy for internal liquidity	Difference between the firm's cash flow in periods t and $t - 1$	+
EMPLOYE	Number of employees, proxy for firm size	Log difference of firm's employees in periods t and $t - 1$	+
TIME	Temporal dummies	A dummy used to control for different time periods	+
COUNTRY	Country dummies	A dummy used to control for specific country characteristics	+
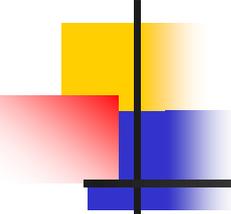
Econometric Model:

- Our panel data model may be represented as follows:

$$Growth_{it} = \alpha_0 + \beta(Size_{it}) + \gamma(Age_{it}) + \theta(X_{it}) + \rho(Y_t) + \mu(Dummy_i) + \varepsilon_{it}$$

(1) X is the set of firm i's specific characteristics (leverage, current ratio, intangible assets, capital productivity, and cash flow ratio), and Y is the set of macroeconomic variables (real gross domestic product per capita, inflation, and tax rate).

(2) Two dummy variables are used in model (1): *country* dummies and *time* dummies in order to control for specific time and country characteristics.

(3) We apply the GMM-system estimator developed by Arellano and Bover (1995), and Blundell and Bond (1998).
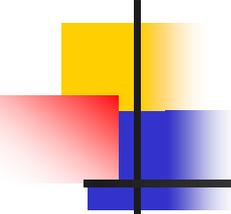
Empirical results:

A. The results in Table 3 (total sample) show that, in line with previous empirical studies, the impact of firm size and age on growth is statistically significant (see Model specification 1)

(1) Model specification 2 shows that the size-age-growth relation remains stable and significant after controlling for other firm specific characteristics, namely:

- The effect on leverage is positive and statistically significant;
- There is a strong and negative relation between a firm's cash flow and its sales growth;
- Short-term liquidity is found to have no statistically significant effect on growth in sales revenues;
- The two size variables (TOT_ASSETS and EMPLOYE) show strong explanatory power (+) in our model;
- Other significant variables are intangible assets (-) and capital productivity factor (+).

Table 3: GMM-system results for operating revenues (2001 – 2005), Total sample

| Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
OP_REVEN (lagged)	-0.030***	-0.029***	-0.017***	-0.022***	-0.022***	-0.022***	-0.021***	-0.009**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.029)
TOT_ASSETS	0.544***	0.469***	0.454***					0.461***
	(0.000)	(0.000)	(0.000)					(0.000)
AGE	-0.050***	-0.045***	-0.044***	-0.059***	-0.059***	-0.060***	-0.055***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LEVER		0.299***	0.309***	0.353***	0.352***	0.343***	0.383***	0.296***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CUR_RATIO		0.0001	0.0001	0.0001				0.0001
		(0.701)	(0.779)	(0.887)				(0.675)
INTA_ASSETS		-0.741***	-0.652***	-0.367*	-0.367*			-0.700***
		(0.000)	(0.002)	(0.096)	(0.096)			(0.001)
CAP_PROD		0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CF_RATIO		-0.153***	-0.152***	-0.149***	-0.149***	-0.148***		-0.154***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
EMPLOYE		0.058***	0.061***	0.074***	0.073***	0.074***	0. 082***	0.052***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFL			0.003					
			(0.135)					
RGDP_G			0.024***	0.037***	0.036***	0.037***	0.044***	
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
TAX_RATE			-0.004*	-0.009***	-0.009***	-0.009***	-0.013***	
			(0.052)	(0.000)	(0.000)	(0.100)	(0.000)	
TIME	No	No	No	No	No	No	No	Yes
COUNTRY	No	No	No	No	No	No	No	Yes
Number of observations	7177	6161	6161	6161	6167	6259	7130	6161
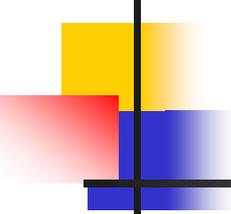
Empirical results (...)

(2) In Model specification 3 we control also for different macroeconomic effects; GDP per capital and tax rate are statistically significant and with the expected signs.

(3) When we drop in each step one (or more) variable(s) that is found to be statistically insignificant, estimated coefficients remain stable and with the appropriate signs.

(4) In model specification 8 we use both country and time dummies in order to control for country specific characteristics and different time periods.

(5) The results of the Arellano-Bond and Sargan tests (shown at the bottom of the table) confirm that all models are well specified.
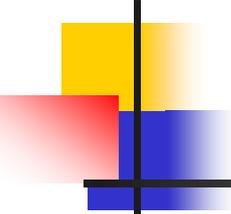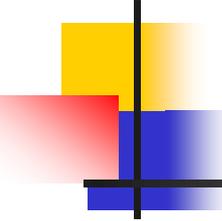
Empirical results(...)

B. We also expect that size and age sensitivity of growth is significantly different for fast-growing and slow-growing firms in the sample (see Tables 4 and 5). We run the same regressions for the two sub-samples.

(1) We find evidence that a firm's growth depends strongly on the traditional characteristics of size and age, no matter how fast or slow a firm is growing.

(2) We provide evidence in support of the hypothesis that fast-growing firms rely more on <u>external sources</u> of capital to support their growth in sales as compared to slow-growing firms where the opposite holds true .

(3) Firms growing faster during the observed period show a significantly <u>larger sensitivity to cash</u> flow; at the same time slow-growing firms rely more on their internal cash flows in order to finance new investments and increase in production.

Table 4: GMM-system results for operating revenues (2001 − 2005), High-growth

| Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
OP_REVEN (lagged)	-0.030***	-0.029***	-0.017***	-0.023***	-0.024***	-0.024***	-0.023***	-0.010**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.048)
TOT_ASSETS	0.585***	0.504***	0.488***					0.495***
	(0.000)	(0.000)	(0.000)					(0.000)
AGE	-0.053***	-0.047***	-0.046***	-0.066***	-0.066***	-0.067***	-0.075***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LEVER		0.344***	0.341***	0.410***	0.409***	0.408***	0.441***	0.332***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CUR_RATIO		0.001	0.001	-0.001				0.001
		(0.553)	(0.599)	(0.673)				(0.641)
INTA_ASSETS		-0.951***	-0.806**	-0.455	-0.456			-0.886***
		(0.003)	(0.013)	(0.191)	(0.190)			(0.007)
CAP_PROD		0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CF_RATIO		-0.154***	-0.153***	-0.151***	-0.150***	-0.150***		-0.155***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
EMPLOYE		0.071***	0.061***	0.088***	0.088***	0. 088***	0. 099***	0.065***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INFL			0.001					
			(0.622)					
RGDP_G			0.024***	0.038***	0.037***	0.038***	0.045***	
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
TAX_RATE			-0.004*	-0.009***	-0.009***	-0.010***	-0.014***	
			(0.100)	(0.000)	(0.001)	(0.000)	(0.000)	
TIME	No	No	No	No	No	No	No	Yes
COUNTRY	No	No	No	No	No	No	No	Yes
Number of observations	5758	5028	5028	5028	5032	5075	5726	5028

Table 5: GMM-system results for operating revenues (2001 – 2005), Slow growth

| Explanatory variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
OP_REVEN (lagged)	-0.020	-0.036**	-0.054***	-0.040**	-0.042**	-0.040**	-0.040**	-0.084***
	(0.215)	(0.037)	(0.001)	(0.023)	(0.017)	(0.020)	(0.021)	(0.000)
TOT_ASSETS	0.238***	0.218***	0.201 ***					0.200***
	(0.000)	(0.000)	(0.000)					(0.000)
AGE	-0.038***	-0.033***	-0.027**	-0.036***	-0.038***	-0.039***	-0.039***	0.003**
	(0.000)	(0.001)	(0.019)	(0.003)	(0.002)	(0.001)	(0.001)	(0.028)
LEVER		0. 075	0.099	0.083*	0.060	0.051	0.051	0.055
		(0.121)	(0.038)	(0.091)	(0.214)	(0.285)	(0.285)	(0.238)
CUR_RATIO		0.0001	0.001	0.0001	0.0001	0.0001		0.0001
		(0.612)	(0.690)	(0.749)	(0.746)	(0.746)		(0.544)
INTA_ASSETS		-0.231	-0.256	-0.042	-0.042			-0.199
		(0.503)	(0.445)	(0.904)	(0.903)			(0.547)
CAP_PROD		0.0001	0.0005	0.0001				0.0002
		(0.898)	(0.961)	(0.945)				(0.884)
CF_RATIO		0.095 ***	0.098 ***	0.060**	0.062**	0.059**	0.059**	0.092***
		(0.001)	(0.000)	(0.037)	(0.031)	(0.039)	(0.039)	(0.001)
EMPLOYE		0.0002	0.0003	0.0005**	0.0005**	0.0005**	0.0005**	0.0001
		(0.389)	(0.170)	(0.032)	(0.030)	(0.027)	(0.027)	(0.723)
INFL			0.019***					
			(0.000)					
RGDP_G			0.023***	0.028***	0.028***	0.028***	0.028***	
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
TAX_RATE			-0.007**	-0.006**	-0.006**	-0.007**	-0.007**	
			(0.030)	(0.050)	(0.045)	(0.027)	(0.026)	
TIME	No	No	No	No	No	No	No	Yes
COUNTRY	No	No	No	No	No	No	No	Yes
Number of observations	1419	1158	1158	1158	1166	1193	1195	1158

Empirical results (...)

- As observed in total sample, firms in fast-growing and slow-growing sub-samples show <u>high sensitivity</u> to changes in macroeconomic conditions

- Again, country dummies are found to have no impact on firm growth whereas the time effects are <u>statistically significant</u> for the years 2004 and 2005 .

C. When growth in total assets is used as dependant variable instead of sales growth we obtain <u>similar results</u> to those in Tables 3 through 5.

(1) The variables that proxy for firm size and age have a significant impact on a firm's growth in assets even after controlling for firm-specific effects

(2) The performance of both types of firms is strongly influenced by changes in the macroeconomic conditions in transition economies during different time periods.
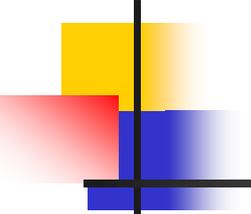
Conclusions:

A. We address the question whether stylized facts of firm growth might be better explained by comparing the size-age-growth relation in fast-growing SMEs to the group of slow-growing SMEs. The results are:

(1) In line with previous research, firm size (when proxied by total assets and the number of firm employees) and age are found to be <u>strong determinates</u> of SMEs' growth.

(2) The size-age-growth relation remains <u>stable and significant</u> even after controlling for other firm specific characteristics such as leverage, current ratio, intangible assets, capital productivity, and cash flow ratio.

(3) Macroeconomic conditions in transition economies also play an <u>important role</u> in explaining the increase in production of small and medium sized firms.
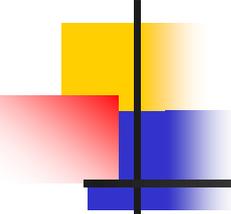
Conclusions (...)

B. One may expect that size and age sensitivity of growth will be significantly different for fast-growing and slow-growing firms in transition economies. We find that:

(1) Firms growing faster, i.e. firms with at least 20% growth in sales or assets in the last three years, show a significantly <u>larger sensitivity</u> to size and age.

(2) In case of high growth firms, the only determinant that has no significant impact on firm growth is the current liquidity. Firms growing faster during the observed period show a significantly <u>larger sensitivity</u> to cash flow than slow-growing firms.

(3) In case of slow growth firm, we find that cash flow-growth relation is significant and positive, whereas leverage and other firm specific characteristics have a marginal impact on a firm's growth in sales.