

Determinants of high-growth firms: Why do some countries have more high-growth firms than others?

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1 Introduction

Because of the evident importance of high-growth firms to the economy these firms have drawn growing attention from policy makers as well as academics. Research in the field of fast growing firms has expanded fast over the past two decades (Storey, 1994; Birch et al., 1997; Schreyer, 2000; Audretsch, 2002; Delmar et al., 2003; Autio, 2007; Acs et al., 2008; Henrekson and Johansson, 2009, 2010; Hözl, 2009; Coad and Rao, 2008). However, knowledge about these firms is still scattered and little knowledge is available regarding differences over countries. According to Henrekson and Johansson (2010, p. 230) the number of studies analysing fast growing firms is still surprisingly small.

Previous evidence points out that fast growing firms are found in all industries and in all regions of the countries (e.g. Schreyer, 2000; Hözl, 2009). However, Schreyer (2000) highlights the importance of "appropriate institutional, legal and administrative framework conditions". Hence, one critical point is to shed light on these framework conditions which may erode the entrepreneur's motivation to grow. This will be done – to a certain extent – in this paper.

Adopting an eclectic approach, we will try to answer why some countries have more high-growth firms than others. Hence, the purpose of this paper is to analyse the determinants of the percentage of high-growth firms at the country level. Our database contains 17 different countries over a time period of 7 years (1999-2005) with information from the Amadeus data set, the Global Entrepreneurship Monitor, and others.

The first contribution of this paper is that it is the first empirical analysis of high-growth firms at the country level. Second, we find indicative empirical evidence for three driving forces of high growth: entrepreneurship, institutional settings, and opportunities for growth. Third, the paper gives a tentative explanation of the differences in the average percentage of high-growth firms between countries. Finally, the paper gives some clues for policy makers how to promote high-growth firms.

The paper is structured as follows. The second section is on theory: what sort of determinants are proposed in the literature? Subsequently, the third section describes the database and presents the model. In section 4 the empirical results are presented. Finally, we sum up and discuss the policy relevance of our results.

2 Theory

Entrepreneurial environment

A starting point for our empirical model is that the entrepreneurial environment may affect the percentage of high-growth firms in a country, because entrepreneurship exerts a positive impact on competitiveness and growth by creating knowledge spillovers, increasing

diversity and competition (Audretsch and Thurik, 2004). Moreover, the link between entrepreneurial abilities and the growth of firms is obvious. Hence, the level of entrepreneurship in a country may in some way or other influence the percentage of high-growth firms. In this study we investigate three different channels in which the entrepreneurial environment may be of influence.

First, we consider the level of education in a country because it is thought to affect positively the entrepreneurs' motivations and firm performance (Hessels et al., 2008). Education generates higher levels of (expected) entrepreneurial ability that, in turn, increases the levels of entrepreneurial performance (Lucas, 1978; Van Praag and Cramer, 2001). Empirical evidence shows a positive relationship between the level of education and high-growth entrepreneurs because more educated entrepreneurs may be better prepared to identify market opportunities (Davidsson, 1991) and have more growth-oriented aspirations (Cassar, 2006, 2007; Stam et al., 2009) given that they will pursue higher returns for their investment (Levie and Autio, 2008; Autio, 2009). Furthermore, Stel et al. (2011) have shown that a higher level of education has a positive impact on the performance of the average entrepreneur because: i) it will modify the demand function and the entrepreneur's output; ii) it will affect positively the productivity of the firm; iii) it may be a signal of the presence of universities, which may generate knowledge spillovers to the nearby firms.

Second, the psychological research shows that entrepreneurs with higher growth-oriented ambitions may allocate more effort to pursue higher returns for their investment and thereby realise a higher growth¹ (Orser and Hogarth-Scott, 2002; Wiklund and Shepherd, 2003). But which kinds of motivations are important for firm growth? On the one hand, income motivations may affect the entrepreneurial growth preferences (Cassar, 2007; Hessels et al., 2008). On the other hand, another reason to choose for entrepreneurship is the greater independence one has in this profession. We argue that entrepreneurs that created a firm in order to achieve a higher level of independence may not be as motivated to undertake risky projects in order to expand their firm.

Third, if entrepreneurship is thought to be a desirable career choice in a country, we expect a relatively high percentage of high-growth firms in that country. The idea is that in such a country more people will try entrepreneurship, eventually leading to better entrepreneurs and more high-growth firms (Tominc and Rebernik, 2007)).

Institutional obstacles

We argue that institutions may have an impact on firm growth. The more obstacles government imposes on firms, the less attractive and the more difficult running a business becomes.

First, a high employment protection represents an extra advantage for working as an employee. Furthermore, high-growth firms need an easy access to the labour market in

¹ Even though ambition does not guarantee growth, absence of ambition almost certainly guarantees absence of growth (Autio, 2009).

order to fuel their growth (Henrekson, 2007). Falkenhall and Junkka (2009) claim that in order to promote fast growing firms, countries should ensure low barriers to entry and contestable markets. Hence, we expect that employment protection affect negatively to high-growth firms.

Second, a higher administrative burden will diminish the entrepreneurial activity and firm growth (Djankov et al., 2002). However, Capelleras et al. (2005) find no significant differences on the subsequent growth of new enterprises in two different regulated countries, England and Spain. Nevertheless, we expect that administrative burden influences high-growth firms negatively.

Opportunities for growth

Limitation of growth opportunities may moderate the impact of growth aspirations on actual growth (Wiklund and Shepherd, 2003).

First, exporting to other countries presents extra difficulties that not all firms are able to face. In line with Davidsson (1991, p.412), we expect countries with a large domestic market to have a higher percentage of high-growth firms.

Second, dynamic economies may enhance the opportunities for firms to grow fast. Bosma et al. (2009) and Bowen and De Clercq (2008) indicate that higher income countries offer more opportunities for growth and higher availability of necessary resources for growth entrepreneurship. Hence, we expect a positive relationship between real GDP growth and the presence of high-growth firms.

Third, the distance to the technological frontier of a country may be of influence to the growth opportunities in a country. The more a country is away from this technological frontier, the more growth opportunities there will exist in such a country, and the more high-growth firms there will be. Stenholm et al. (2010) find that in so-called transit economies growth expectations are higher compared to Western European countries. Hölzl (2010) shows that R&D plays a more important role on high-growth firms in countries close to the technological frontier. Also there is evidence that high-growth firms are able to obtain higher returns to innovation (Coad and Rao, 2008) and invest more in R&D (Coad and Rao, 2010).

Fourth, the perception of good business opportunities may affect the existence of high-growth firms. First, it may be the case that this perception is actually true so that there are indeed more and better business opportunities so that more firms will actually manage to grow fast. Second, the general perception of profitability opportunities in the market, as seen by the people of the country themselves, may affect firm growth in itself (Reitan, 1997). The perception itself may encourage the creation of new firms and their performance (see, Davidsson, 1991; Tominc and Rebernik, 2007). Consequently, our hypothesis is that the percentage of people that think that there are good business opportunities in their country has a positive relation with the percentage of high-growth firms.

Finally, we expect that the growth expectations of the entrepreneurs themselves will be positively related to the percentage of high-growth firms in a country. Again there are two mechanisms: i) the growth expectations can be based on really better prospects; ii) they can act as self fulfilling prophecies.

3 Data and Econometric model

3.1. Data

This paper uses a wide variety of data sources. First, the Amadeus data base to obtain the information on high-growth firms. Second, the Adult Population Survey (APS) data collected in the Global Entrepreneurship Monitor (GEM) study. Furthermore, we use also data from the World Bank statistical database, the IMF World Economic Outlook Database, the World Bank Doing Business database, the CEPOECD Institutions Data Set, and Eurostat. We consider 17 countries (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Netherlands, Poland, Spain, Sweden, United Kingdom and United States) for the period 1999-2005. We have 112 observations.¹

Dependent variable

high growth is the percentage of firms with a size of 50-1000 employees that have realized an average turnover growth of 20% per year over the last three years. Source: Snel et al. (2010) and Timmermans et al. (2009).²

Variables characterizing the entrepreneurial environment

- *Tertiary education*: percentage of students in tertiary education over the population in the age 18-23.
- *Income motive*: percentage of early-stage entrepreneurs that declare that their motive to become entrepreneur was to increase their personal income. The value corresponds to year 2005.
- *Independence motive*: percentage of early-stage entrepreneurs that declare that their motive to become entrepreneur was to obtain a greater independence. The value corresponds to year 2005.
- *Desirable career choice*: percentage of inhabitants of a country that think that most people in their country consider starting a new business a desirable career choice. The value corresponds to year 2006.

Variables indicating institutional obstacles

¹ We do not have observations for the dependent variable in 2002 for Austria, Czech Republic, Poland, Spain and Sweden. For Hungary, there are not observations for 2002 and 2003.

² Actually, we investigated the influence of some more independent variables including the enrolment in secondary education, the development of the financial system, the level of export barriers, among others. Because these variables did not appear to have significant influence, we do not describe them in this section and do not include them in the final regression models of section 5.

- *Employment protection*: index that measures the strictness of employment protection legislation, where higher values correspond to higher employment protection.
- *Start-up procedures*: number of procedures that a start-up has to comply with in order to obtain a legal status. The value corresponds to year 2005.

Variables indicating opportunities for growth

- *Population size*: log number of inhabitants (with base 2).
- *GDP growth*: percentage of the annual change of GDP at constant prices.
- *Technological development*: ratio of the overall productivity (added value per worker at constant prices and expressed in US\$) of the USA and the country under consideration.
- *Business opportunities*: percentage of inhabitants that think that in the next 6 months there will be good opportunities for starting a business in the area where they live.
- *Growth expectation*: percentage of early-stage entrepreneurs that expect to have over 19 employees in five years.

3.2. Model

Our model uses the following expression:

$$HG_{i,t} = \alpha + \beta_1 X_{1i,t} + \beta_2 X_{2i} + u_{i,t}$$

where $HG_{i,t}$ denotes the percentage of high-growth observations of a country (i) in a year (t), $X_{1i,t}$ the time dependent variables, X_{2i} the time invariant variables, and u_{it} the error term. Since the dependent variable is a fractional response form, Papke and Wooldridge (1996) propose the Fractional Logit Regression Model (FLRM) using Quasi-Maximum Likelihood Estimation (QMLE) which maximizes the Bernoulli log-likelihood function:

$$\underset{\beta_i}{\text{Max}} \ln L = \sum \ln L_{i,t} = \sum \left[HG_{it} \ln G(\beta_1 X_{1i,t}, \beta_2 X_{2i}) + (1 - HG_{it}) \ln(1 - G(\beta_1 X_{1i,t}, \beta_2 X_{2i})) \right]$$

Because high growth is a phenomenon over a three-year period, one could argue that there is an inherent dependence between consecutive observations because of the two overlapping years. For instance, the percentages of high-growth firms in the periods 2002-2004 and 2003-2005 might be correlated because they share two overlapping years (2003 and 2004). However, most of high-growth firms in one period are not any more high-growth in the consecutive period. Indeed, in practice high growth appears to be a highly volatile phenomenon at the individual firm level.¹

¹ We perform several checks on the robustness of the standard errors reported. One of the main econometric problems in our estimation procedure may be caused by the fact that the observations of our variables within a country are highly correlated. First, we correct the standard errors by using the so-called Moulton factor (Moulton, 1986). Second, we make such a correction by repeating the main analysis while clustering the standard errors by country. Third, we correct the standard errors by bootstrapping the distribution of the empirical data with clustered data at the country level. Table 6 shows the resulting standard errors with each of these three methods. Our results presented with the FLRM methodology remain significant. Results are available in Teruel and Wit (2011).

4 Results

Table 1 shows our results. Model (1) includes our five independent variables for which we have information for the whole period. The influence of all variables appears to be significant with the expected sign and with a low level of dispersion¹.

The quality of entrepreneurship in a country seems to matter. Hence, a higher enrolment in *tertiary education* can be associated with a better potential for entrepreneurship in a country, which may give rise to more high growth.

We find also evidence that institutional obstacles may play a negative role with respect to the percentage of high-growth firms. In section 2 we explained why a larger domestic market may lead to more high growth. Indeed, we find if *population size* - our proxy for the size of the domestic market - doubles, this is associated with approximately 0.7 percent point more high-growth firms.² We have argued that high *GDP growth* is associated with more high-growth firms. This relationship is two way: a higher GDP growth leads to more growth opportunities for firms, while the other way around more high-growth firms may lead to higher GDP growth. Hence, the positive relationship that we find for GDP growth and high-growth firms should not be interpreted as causal. Therefore, GDP growth is a control variable³. Finally, countries far from the technological frontier show more opportunities for high growth.

Model (2) incorporates as many independent variables as possible, while taking care to avoid multicollinearity⁴.

Table 1.
Explaining the percentage of high-growth firms. Marginal effects of Fractional Logit Regression Model⁵.

	(1)	(2)	(3)	(4)	(5)
Entrepreneurship					
tertiary education	0.22*** (0.04)	0.23*** (0.05)	0.22*** (0.04)	0.18*** (0.05)	0.23*** (0.04)
income motive		0.23*** (0.06)			
independence motive			-0.30*** (0.06)		
desirable career choice		0.17*** (0.05)			
Institutional obstacles					

¹ Pearson χ^2 test is equal to 0.0179 which indicates that the level of dispersion is low.

² This holds true because population size is measured by the logarithm with base 2.

³ One way of disentangling this two-way causal relationship would be to introduce various lagged GDP growth rates into our model. We refrain from such an exercise in our paper because (i) this is not the primary aim of our paper and (ii) because of the sample size we want to restrict ourselves to a minimum of independent variables. Nevertheless, we have experimented with it. The results are available upon request.

⁴ In this approach, we first tried all eleven independent variables at once. Subsequently, we dropped the least significant variable successively until all remaining variables were significant.

⁵ The estimated coefficients from the FLM are shown in Table A-2 in the Annex.

employment protection	-3.27***	-2.28***	-2.23***	-3.02***	-2.37***
	(0.70)	(0.74)	(0.65)	(0.69)	(0.85)
start-up procedures		-0.38*			
		(0.26)			
Opportunities for growth					
population size	0.67**	0.59*	0.37	1.01***	0.65**
	(0.31)	(0.36)	(0.30)	(0.32)	(0.32)
GDP growth	2.06***	1.62***	1.96***	1.98***	1.98***
	(0.30)	(0.28)	(0.28)	(0.29)	(0.31)
technological development	2.31***	2.26***	2.18***	2.53***	2.43***
	(0.42)	(0.40)	(0.36)	(0.41)	(0.40)
business opportunities				0.10**	
				(0.05)	
growth expectation					2.48
					(0.00)
Pearson χ^2	0.0179	0.0139	0.0152	0.0176	0.0179
AIC	0.7883	0.8369	0.8029	0.8055	0.8058
BIC	-49814	-484.54	-493.79	-493.50	-493.46
number of observations				112	
<i>Standard errors in parentheses</i>					
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$					

Results of model (1) remain robust in model (2). Additionally, the Pearson χ^2 test and the BIC statistic obtain the lowest value in model (2) but the AIC statistic shows a slightly higher value than model (1). Hence, in spite of the increase in the AIC statistic there seems that model (2) is the most well-specified.

The ambition of entrepreneurs in a country seems to influence high growth. If more early-stage entrepreneurs declare that their motive to become entrepreneur was to increase their personal income, this is associated with more high growth. Furthermore, the status of entrepreneurship seems to matter also. Finally, we find that a higher administrative burden leads to fewer high-growth firms.

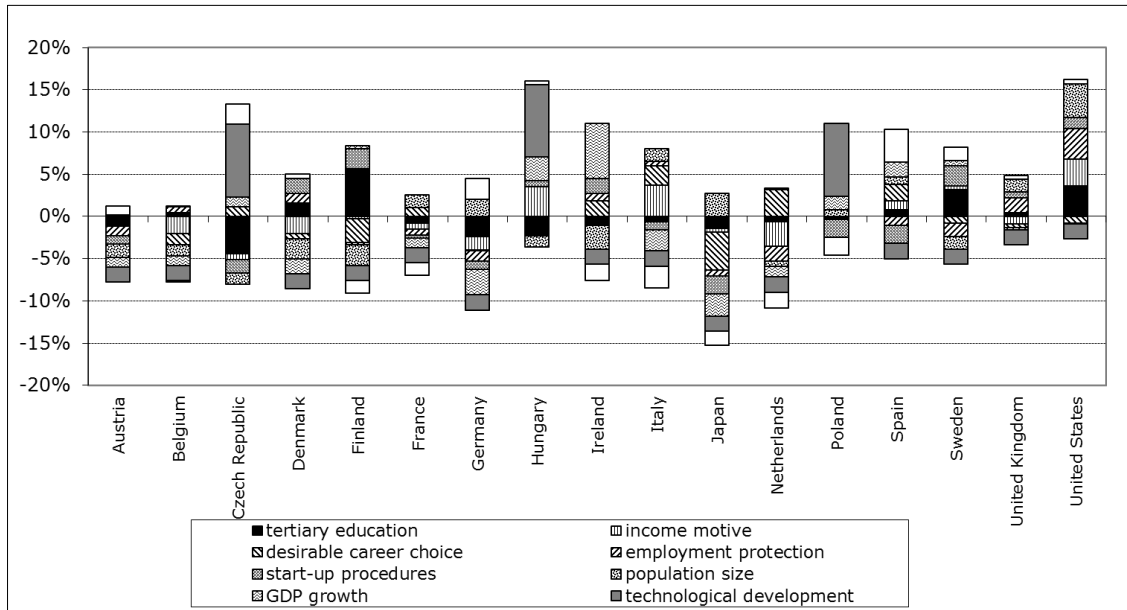
Because of multicollinearity we had to leave out three of our independent variables in model (2). In models (3) –(5) of Table (1) we inserted these variables separately one by one in model (1). Again model (1) appears robust.

We find that if many entrepreneurs in a country are motivated for entrepreneurship in this way, one expects relatively few high-growth firms, as explained in section 2. Finally, if people in a country see more *business opportunities* or early-stage entrepreneurs *expect more growth* then you would expect more high-growth firms in that country. Models (4) and (5) confirm these expectations.

With the above models it is possible to give a tentative explanation of the differences in the average percentage of high-growth firms between countries. We will do such a tentative exercise on the basis of model (2).

Figure 1 shows the percentage points that are explained by each explanatory variable.

Figure 1. Explaining the average percentage of high-growth firms between countries on the basis of model (2) from table 3



We may stand out the following results (Figure 1):

- For most countries our model (2) explains the average percentage of high-growth firms quite well, except for Czech Republic, Hungary, Italy, and Spain.
- United States have on average the highest percentage of high-growth firms. The most important determinants are: (i) a high enrolment in tertiary education, (ii) many entrepreneurs desire to obtain a higher income, (iii) a low degree of employment protection, (iv) a large domestic market.
- Japan has the lowest percentage of high-growth firms. Nearly all distinguished variables contribute to this. The two most important determinants are: (i) few Japanese think that entrepreneurship is a desirable career choice, (ii) a low GDP growth in the period of investigation.

5 Summary

This study gives some insights about the driving forces of the number of high-growth firms in a country. The first contribution of this paper is that it is – as far as we know – the first empirical analysis of high growth at the country level on the basis of actual measured growth. The second contribution is that we find indicative empirical evidence for three driving forces of high growth, viz. entrepreneurship, institutional settings, and opportunities for growth, all in accordance with theory and empirical findings in related fields of research. Third, on the basis of the findings of this paper it is possible to give a tentative explanation of the differences in the average percentage of high-growth firms between countries.

For those policy makers that seek to stimulate high growth in their country, the paper has a number of suggestions. First of all, results suggest that entrepreneurship has a positive influence on high growth. Three specific channels appear to stimulate entrepreneurship:

- to stimulate the enrolment into tertiary education which may lead to a higher quality of entrepreneurship

- to stimulate the ambition of entrepreneurs (as measured by their motive for becoming entrepreneur)
- to promote the notion that entrepreneurship is a desirable career choice.

Second, results suggest that institutional obstacles play a negative role. The paper provides tentative evidence that the following two strategies might be fruitful in this context:

- to lower the degree of employment protection legislation thereby (i) making the choice for entrepreneurship more attractive and (ii) lowering the risks when attracting employees for the high-growth firm
- to lower the administrative burden for firms.

Finally, the size of the domestic market influences positively on high-growth firms. This suggests that the creation of common markets with other countries may be a good strategy.

6 References

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