Drivers of High-Growth Firms: Strategic Modes of Growth and Knowledge Processing Capabilities

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Abstract

This paper explores the factors that are most likely to drive high-growth firms (HGFs) in times of crisis. In an attempt to open the black box of this special type of firms, we examine the role of strategic modes of growth and knowledge processing capabilities of firms. We consider different forms of firm growth based on five alternative growth metrics, i.e. relative employment growth, absolute employment growth, birch employment growth, relative sales growth and absolute sales growth. For the analysis of HGFs, a particularly rich dataset is utilized based on a two-wave survey of 1,500 Greek firms conducted in 2011 and 2013. Our findings indicate that adopting an internationalization strategy significantly increases the likelihood of becoming a fast-growing firm in adverse economic conditions irrespective of the growth metric used. Specialized knowledge of employees, in-house R&D and diversification strategies are also found to play a relevant role in some cases.

1. Introduction

The academic interest for high-growth firms (HGF) has been intensified during the last years, largely due to the contribution they are considered to have in terms of employment growth and economic development. Indeed, it has been demonstrated that firms' growth rates are extremely skewed with a small number of HGFs being responsible for a disproportionately large amount of job creation (Coad et al., 2014; Henrekson and Johansson, 2010; Acs et al., 2008; Delmar et al., 2003).

This stylized fact has motivated a considerable volume of research focusing on fast-growing, rapid-growth, high-impact or high-growth firms. Even though the label and the definition may differ, all these terms generally refer to a special type of firms which exhibit particularly high rates of growth and are commonly inspired from the pioneer work of Birch on the so-called 'gazelles' (Birch, 1979). Since then a number of studies have consistently provided evidence that it is not new firms per se but a relatively small number of HGFs that drive job creation (Storey, 1994; Daunfeldt et al., 2015). Along these lines, entrepreneurship literature suggests that HGFs are the main engine of economic development and not just new ventures or small firms in general (Shane, 2009; Wong et al., 2005; Stam et al., 2009).

From a policy perspective, related research tends to question policies targeting the quantity of start-ups as a way to enhance economic growth and create jobs (e.g. Shane, 2009, Hölzl, 2014). Instead of subsidizing the formation of a typical start-up, Shane (2009) recommends that policy makers should focus on this subset of businesses with growth potential, arguing that it is better to have a small number of HGFs rather than a large number of typical start-ups. What is more, the recent financial crisis underlined the need for encouraging ventures of a rather 'special' form

that can be sustainable in adverse times and support growth and employment (e.g. Giotopoulos et al., 2017). Indeed, HGFs are likely to be more resilient to economic recessions constituting at the same time an important driver for economic development (Autio and Acs, 2010; Henrekson and Johansson, 2010). In this vein, policy priorities at national as well as international level seem to change during the last years in favour of HGFs. European Commission sets supporting high-growth SMEs as a political objective in its Europe 2020 Strategy report (European Commission, 2010), while OECD examines ways in which governments can promote high-growth enterprises (OECD, 2010).

Given the rising academic and policy attention to HGFs, a considerable volume of recent studies attempt to (re)define, map and profile this special type of firms. Extant research explores firm-specific attributes of HGFs such as size (Weinzimmer et al., 1998; Delmar et al., 2003; Shepherd and Wiklund, 2009) and age (Delmar et al., 2003; Haltiwanger et al., 2013). Coad et al. (2014) based on related stylized facts they conclude that *"HGFs tend to be young but are not necessarily small"*. Other studies focus on industrial (Delmar et al., 2003; Halabisky et al., 2006; Acs et al., 2008) or spatial characteristics of HGFs (Stam, 2005; Acs and Mueller, 2008), while the strategic intentions of this type of enterprises have been also investigated (Gundry and Welsch, 2001).

Nevertheless, our knowledge on how these firms achieve high-growth rates, especially in turbulent economic environments, is still limited. McKelvie and Wiklund (2010) acknowledge this gap in the growth literature in general. In this respect, they highlight the substantially qualitative differences that may exist in terms of how firms manage to grow, drawing attention to different modes of growth. Also, strategic management literature emphasize mergers and acquisitions, diversification

and internationalization as the main strategic practices that allow firms to expand their horizontal boundaries (Besanko et al., 2009).

Moreover, the Penrose's (1959) theory of growth provides strong argumentation according to which the generation, assimilation and transfer of knowledge at the firm level is of vital importance for the support of firm growth. In other words, it seems that firm growth depends on the processes through which knowledge is acquired and utilized (Macpherson and Holt, 2007). The knowledge obtained by firms from R&D activities and human capital facilitates the expansion of their resource base from which new opportunities can be pursued being in turn crucial for firm growth (Garnsey et al., 2006; Macpherson and Holt, 2007).

In this context, this study attempts to open the black box of HGFs by exploring whether and in which way strategic modes of growth and knowledge processing capabilities of firms drive HGFs in Greece in times of crisis. To identify HGFs we use alternative growth metrics, i.e. relative, absolute and mixed measures based on both firms' employment and sales. Since not all HGFs grow in the same way, it is important to measure different forms of growth with various growth measures (Delmar et al., 2003; Coad et al. 2014). The data used in the empirical analysis come from a two-wave survey of 1500 firms conducted in 2011 and 2013 in Greece. Estimation results from probit models cast light on the driving forces of HGFs in terms of strategic modes of growth and knowledge processing capabilities in relation to the examined growth measures.

The paper is laid out as follows: section 2 describes the survey data, the sample and the econometric methodology used; section 3 presents and discusses the results of the empirical analysis; section 4 concludes and provides some policy implications.

2. Data and Methodology

2.1 Survey Data

The data used in this paper stems from an extensive field survey in the 2000 largest (in terms of employment) firms in Greece. The survey was carried out in two waves, one in 2011 and the next one in 2013. The second wave targeted the same group of firms that had participated in the first wave. This process was successful for almost 80% of the sample. Thus, the final sample that is used in this paper contains 1500 Greek firms which are the ones participated in both survey waves.

The empirical instrument of the survey, was a structured questionnaire that includes four major modules on firms' characteristics: a) a "strategy section" with questions on the adopted strategies from the examined firms, b) a "performance section" where analytical information of the firms' investment plans and economic performance was retrieved along with projections for the following years, c) an "innovation section" where questions about the innovation performance, R&D activity, patent activity and how such efforts were affected by the crisis were included, and d) a "human capital section" considering structural characteristics on firms' employees. All interviews were undertaken through CATI method and the contact person was in the vast majority of the cases the CEO of the firm.

2.2 Variables and model specification

The dependent variable, that is HGFs is measured by a binary variable taking the value of 1 if the firm belongs to the upper 10% of the firm growth distribution in our sample, and 0 otherwise. This is in the same line with other studies which adopt an

empirical rule in order to define HGFs based on the upper 1%, 5% or 10% of the growth distribution of firms in their sample over a specific time period.[1]

However, the composition of HGFs may be affected by the growth metric used (Coad et al. 2014). In particular, relative change indicators are measured by percentage changes or log-differences, while absolute change indicators are measured by raw changes in size between two time points. Measures of absolute growth are biased toward larger firms, while measures of relative growth are biased toward smaller firms. More popular are indices that combine absolute and relative change into one number such as the Birch index.

Another important issue in firm growth literature refers to the use of a proper growth indicator. Sales and number of employees are the most commonly used variables which growth indicators are based on. Since sales and employment growth are only modestly correlated (Shepherd and Wiklund, 2009; Coad, 2010), the use of the respective growth indicators could potentially lead to the identification of different sets of HGFs. However, most studies suggest that the results do not seem to be sensitive to which one is chosen (Daunfeldt et al., 2015).

In this study we use five alternative growth metrics which are constructed based on both employment and sales variables as follows:

Relative employment growth = ln(Employment2013)-ln(Employment2011)

Absolute employment growth = (Empolyment2013) - (Employment2011)

Birch indicator of employment growth = [(Empolyment2013) - (Employment2011)]* (Employment2013 / Employment2011)

[1] Eurostat and OECD provide an alternative recommendation according to which firms with at least 10 employees in the start-year and annualized employment growth exceeding 20% during a 3-year period (Eurostat-OECD, 2007) are considered as HGFs.

Relative sales growth = ln(Sales2013)-ln(Sales2011)

Absolute sales growth = (Sales2013)-(Sales2011)

Table 1 provides summary statistics of the aforementioned growth metrics.

"Table 1 here"

Focusing on the factors that many drive HGFs, we classify the used explanatory variables in two broad categories, namely strategic modes of growth and knowledge processing capabilities. As regards strategic modes of growth, we use three variables which refer to mergers and acquisitions, diversification strategy and internationalization strategy. Knowledge processing capabilities are captured by four independent variables, that is participation in research projects, in-house R&D, training and specialized knowledge of employees. The explanatory variables in our empirical analysis are analytically described below:

Mergers and acquisitions: Firms were asked to estimate on a Likert scale ('not used' to 'high') the extent to which mergers and acquisitions is a part of their strategy in the last two years.

Diversification strategy: Firms were asked to estimate on a Likert scale ('not used' to 'high') the extent to which they have penetrated in different industries from their primary activity in the last two years.

Internationalization strategy: Measured by a binary variable that takes the value of 1 when the firm is an exporter and 0 otherwise.

Participation in research projects: Firms were asked to estimate on a Likert scale ('not used' to 'high') the extent to which they have developed joint research projects with universities and research institutes in the last two years.

In-house R&D: Measured by a binary variable that takes the value of 1 if the firm has an in-house R&D department and 0 otherwise.

Training: Measured by a binary variable that takes the value of 1 if the firm declares that it has trained its employees through internal or external training procedures, and the value of 0 otherwise.

Specialized knowledge of employees: Measured by the percentage share of employees with a PhD and/or a master degree.

We also take into account firm- and environment-specific characteristics. In specific, we use firm sales as a measure of firm size and we also include a set of sector dummies in our model.

The econometric analysis is based on the estimation of the following equation:

Pr(HGFs=1)=f{mergers & acquisitions; diversification strategy; internationalization strategy; in-house R&D; participation in research projects; specialized knowledge of employees; training; firm size} (1)

where *Pr(HGFs=1)* stands for the probability for a firm to belong to the group of HGFs. We estimate five models of the form of (1) corresponding to the five alternative growth metrics we employ to define the HGFs as described above. Since the dependent variable in either case is measured by a binary variable we employ probit regressions to identify the driving forces of the probability of firms to become HGFs. In specific we compute the marginal effects of the explanatory variables on the probability of a firm to belong to the group of HGFs for each of the five models. As a common practice, for the computation of the marginal effect of a specific variable we set all other variables at their mean value.

Furthermore, a correlation matrix is provided in Table 2 indicating the absence of high correlations among the independent variables, which in turn ensures that the econometric estimates are not biased due to possible multicollinearity problems.

"Table 2 here"

3. Results

Table 3 presents the estimation results of equation (1) for the five growth indicators used to define HGFs in this study. Once again we note that the groups of HGFs are different among the estimated models since they are based on different growth metrics.

"Table 3 here"

Focusing, first, on the strategic modes of growth our results indicate that there is a positive and highly significant impact of internationalization on the probability of being a HGF. Notably, this interesting result applies to all groups of HGFs, i.e. all five models, meaning that it is independent of the growth metric used to determine HGFs. Being engaged in export activities seems to substantially increase the probability of exhibiting high-growth rates either these (growth rates) concern a firm's sales or employment or they are computed using relative, absolute or birch indicators. This result may imply that a firm which opts for growth via foreign market penetration/internationalization significantly increases its likelihood to grow fast/exhibit high-growth rates in terms of sales or employment. Indeed, some authors have identified a positive relationship between exports and firm growth (Robson and Bennett, 2000; Beck et al., 2005), though evidence in the context of HGFs is rare if not totally absent.

Regarding the rest of the examined strategy-related growth modes, diversification is found to increase the probability for a firm to belong to the group of HGFs based on the relative employment growth metric. It seems that firms which diversify their activities penetrating in different industries improve their chances to achieve high employment growth as measured by the relative indicator (model 1). In addition, our results provide weak evidence on the importance of mergers and acquisitions for being a HGF since the corresponding effect is found significant at a 10% significance level in the case of models 2 and 3. In examining growth patterns among high-growth ventures, Delmar et al. (2003) identify acquisitions and not organic growth as the primary source of employment growth. In the same direction, Hambrick and Crozier (1985) note that the success of many HGFs is attributed to their acquisition activity.

With respect to firms' capabilities for organizational knowledge processing the picture based on our results is not so clear. It seems that internal sources of knowledge are associated with an increased probability to grow fast, though this relates to specific growth measures. More particularly, we find that specialized knowledge of employees increases the likelihood of firms to exhibit high-growth patterns in terms of sales growth (models 4 and 5). Also, our results indicate that firms being engaged in in-house R&D activities are more likely to belong to the group of firms with the highest relative employment growth (at a 5% level of significance) and highest employment growth based on the birch indicator (at a 10% level of significance).

On the other hand we find a negative significant effect of participating in research projects on the probability to belong into the group of HGFs defined using the absolute sales growth (model 5). A possible explanation of this result may relate to the considerable lags between the time of a valuable discovery resulting from research collaboration and its conversion into commercial success. Being engaged in all

activities and procedures that are required to economically exploit an innovative idea may be difficult, costly and time consuming (Coad and Rao, 2008). Thus, the effect of research collaboration on growth sales may be absent or even negative at the first stages of such research activities (Bloom and Van Reenen, 2002).

4. Conclusions

The contribution of fast growing firms to job creation and economic development has been long acknowledged in the growth literature. In the light of the recent economic crisis, high-growth firms have been lately receiving increasing attention from a both academic and policy perspective indicating a (re)focus on high-growth enterprises instead of small or new firms in general. However, our knowledge on the manners in which this special type of firms achieves high-growth rates is still rather limited. What is more, evidence from crisis periods is scarce.

This paper explores the drivers of HGFs in Greece at times of crises, taking into account the heterogeneous nature of growth in this type of firms. To this end, a particularly rich dataset is utilized based on a two-wave survey of 1500 Greek firms conducted in 2011 and 2013. Given that the process of growth is different for different firms, five alternative measures of growth are computed, leading to different groups of high-growth firms. Strategic modes of growth and firms' capabilities for organizational knowledge processing are explored and assessed as potential drivers of high-growth firms in Greece during the crisis period.

Results from Probit models indicate that firms which adopt an export-oriented strategic mode of growth have increased probability to grow fast irrespective of the growth metric employed. This strong and highly significant result may have interesting policy implications, pointing to the need to support and facilitate the

export activity of entrepreneurial ventures through, for example, tax motives, lifting administrating barriers to exports (costs, time, paperwork), networking, participation in business trade fairs etc. In addition, diversification is found to be a significant driver for firms exhibiting high employment growth (in relative terms), while our results provide weak evidence on the importance of inorganic growth modes through mergers and acquisitions. Finally, regarding knowledge-related factors we find that employees with specialized knowledge significantly increase the likelihood of firms to belong to the group of firms with the highest sales growth. In-house R&D activities are also found to be associated with increased probability of exhibiting high growth measured by specific employment growth indicators.

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Table 1. Summary statistics of firm growth metrics

	Mean	**Standard Deviation**	**10% percentile**	**25% percentile**	**50% percentile**	**75% percentile**	**90% percentile**
Relative Employment Growth	-0.1409	0.9096	-0.7576	-0.3566	-0.1000	0.0588	0.3683
Absolute Employment Growth	-9.5053	349.6836	-40	-13	-3	2	20
Birch indicator of Employment Growth	1293.569	19215.66	-19.8	-7.9687	-1.8918	2.0816	24
Relative Sales Growth	-0.1908	0.6186	-0.6892	-0.3347	-0.1108	0.0978	0.2731
Absolute Sales Growth	-4368409	4.35e+07	-8087326	-2521683	-411764.7	560381.2	2825589

Table 2. Correlation Matrix

	Mergers & Acquisitions	Diversification	Internationalization	In-House R&D	Research Projects	Education	Training	Size
Mergers	1							
Diversification	0.1188	1						
Internationalization	0.0791	0.0450	1					
In-House R&D	0.0934	0.1176	0.1449	1				
Research Projects	0.0570	0.0707	0.0938	0.3035	1			
Education	0.0053	0.1076	0.0283	0.1497	0.1842	1		
Training	0.0928	0.1937	0.0384	0.2083	0.1316	0.1102	1	
Size	0.1284	0.1098	0.0550	0.2741	0.1932	0.0548	0.2759	1

Table 3. Determinants of the probability of a firm to belong to a group of HGFs

	Model 1 (Relative EG)	**Model 2** (Absolute EG)	**Model 3** (Birch indicator)	**Model 4** (Relative SG)	**Model 5** (Absolute SG)
Strategic Modes of Growth					
Mergers & Acquisitions	0.0554	0.0744*	0.0735*	0.0652	0.0344
	(0.0437)	(0.0430)	(0.0426)	(0.0521)	(0.0563)
Diversification	0.1060***	0.0646	0.0483	-0.0391	-0.0751
	(0.0398)	(0.0411)	(0.0402)	(0.0440)	(0.0501)
Internationalization	0.3211**	0.4297***	0.4499***	0.5197***	0.3883**
	(0.1627)	(0.1586)	(0.1554)	(0.1817)	(0.1992)
Knowledge Processing Capabilities					
In-House R&D Department	0.3120**	0.1585	0.2355*	0.1951	0.2112
	(0.1443)	(0.1323)	(0.1298)	(0.1566)	(0.1605)
Participation in Research Projects	0.2852*	0.2307	0.2135	-0.4171*	-0.5393**
	(0.1715)	(0.1560)	(0.1553)	(0.2155)	(0.2194)
Specialized Knowledge of Employees	-0.0078	-0.0072	-0.0041	0.0099**	0.0145***
	(0.0053)	(0.0056)	(0.0052)	(0.0049)	(0.0052)
Training of Employees	0.0724	0.2463*	0.2162*	0.0993	0.0509
	(0.1180)	(0.1350)	(0.1305)	(0.1398)	(0.1732)
Firm Size	-0.3225***	0.1466***	0.0981**	-0.1529***	0.3889***
	(0.0456)	(0.0389)	(0.0384)	(0.0455)	(0.0504)
Constant Term	-1.1348**	-2.8625***	-2.5571***	-3.0976	-7.9650***
	(0.5228)	(0.4411)	(0.4338)	(176.71)	(0.9597)
Log likelihood	-369.27	-368.24	-379.17	-286.75	-249.52
LR test (χ^2)	106.61***	95.09***	82.29***	60.29***	112.31***
Number of obs	1343	1343	1343	985	985

Notes: The table reports marginal effects of ordered probit regressions. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level. Standard errors are reported in parentheses. Sector dummies are included in the regression estimations.