Investigating institutional, economic and social determinants of European regions for firm growth through employment generation

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DOI:
10.1111/1467-8551.12383

Investigating Institutional, Economic and Social Determinants of European Regions for Firm-growth through Employment Generation

Abstract

This paper examines the influence of institutional, economic and social characteristics of a region on firm growth through employment generation across 14 European countries for the time period 2010-2013. Theoretically, we utilise the resource-based view alongside insights from institutional theory to develop a conceptual framework that captures the influence of regional characteristics on firm employment growth. Based on this framework, our empirical results indicate that firm growth depends not only on the firm-specific characteristics found in literature, but that regional attributes significantly impact firm growth in a heterogeneous way for different firm types. In line with the heterogeneous nature of firm growth, our results point to significant differences in the influence of institutional, economic and social characteristics on firm growth in different size groups and across different rates of the growth distribution. Implications of our study suggest the importance for managers and policy-makers to realise which firms are mostly expected to benefit from the external environment, which in turn can be planned via tailored policy reform by regional governments and firm level strategy making by managers.

Keywords: Firm growth, high-growth firms, Europe, determinants, institutions, quantile regression

1. Introduction

The literature on firm growth shows evidence that a small share of firms account for a large proportion of job creation in both recessionary periods and economic booms (Anyadike-Danes and Hart, 2012a; Anyadike-Danes and Hart, 2012b). This marked skewness in growth rates across firms has brought to the fore the importance of high growth firms (HGFs) which are firms that experience employment growth of at least 20% over a three-year period and employ at least 10 employees at the start of the growth period (Eurostat-OECD, 2007)[i]. The economic impact of HGFs is shown to be significant in a number of developed countries. For example, in the UK the number of HGFs is reported to be around twelve thousand during 2012-15, which generate 20% of all job growth amongst established businesses (Anyadike-Danes and Hart, 2015). Daunfeldt et al. (2014) report that the top 6% of the fastest growing firms in Sweden have contributed 42% of the jobs during 2005–2008. The disproportionally higher impact of HGFs on employment is also reflected in terms of their superior productivity levels (Du and Temouri, 2015), innovation capabilities (Colombelli, et al., 2014; Segarra and Teruel, 2014; Coad, et al., 2016) and turnover growth (Du and Bonner, 2017). Recent evidence from Eurostat (2017) shows that 10% of all European firms can be considered HGFs[ii] employing a labour force of over 13.5 million employees in many different industries.

Therefore, HGFs have attracted considerable interest by governments and the policy community as key potential drivers of employment generation, industry growth, innovation and wealth creation (Schreyer, 2000; OECD, 2002; Acs et al., 2008; NESTA, 2011). In understanding more fully the nature and characteristics of such exceptional firms, governments in many developed countries are keen in nurturing firms to become HGFs, reduce barriers to business growth across different regions and sectors and supporting with various initiatives HGFs to sustain and reach their full potential (UK Department for Business, Energy and Industrial Strategy, 2017).

However, the literature on HGFs has often been a-contextual, failing to acknowledge the embedded and contingent nature of business growth and its dependency on the firms' location (Hart and McGuinness, 2003; Audretsch and Dohse,

2007; Zahra and Wright, 2011). Thus, the lack of including context in studies on HGFs is an important limitation, especially when it has been recognised that growth ambition and realised growth are strongly conditioned by the regional socio-economic environment within which the firm is embedded (Armington and Acs 2002; Davidsson and Wiklund, 2006). Macpherson and Holt (2007) and Wiklund et al. (2009) stress the importance of internal capabilities as well as the external environment in shaping business performance. Therefore, we argue that little is known about the link between the socio-economic impact of regions and the employment generation of firms in general and HGFs in particular.

More specifically, the principle research objective of our paper, is to examine the heterogeneous effects of institutional, economic and social characteristics of regions on employment growth of firms in 14 European countries. We contribute to the firm-growth literature in three distinct ways. Our first contribution is to include the institutional, economic and social dimension of regions as additional contextual factors, which can explain differences in firm-growth. This builds on and extends recent work that investigates how institutional differences across countries explain the level of HGFs (Pereira and Temouri, 2018; Wang et al. 2015; Chaston and Sadler-Smith, 2012). We draw insights from the literature on regional studies in order to advance the on-going debate on success factors that can contribute to a regional eco-system conducive for creating more HGFs. We do this by presenting a broad theoretical framework through the lens of the institutional theory and the resource-based view (RBV) to connect institutional, economic and social characteristics of different regions as determinants for firm growth, through employment generation. We then explicitly provide theoretical explanations why one should expect the impact to differ across firm size and stages of the growth distribution based on which we derive our hypothesis.

Our second contribution is to complement our theoretical framework with empirical evidence on the importance of regional characteristics as determinants of such firm growth. Our analysis is based on a dataset comprising almost 240.000 firms located in 174 NUTS-2 regions across 14 European countries for the time period 2010-2013. Such large number of firm observations is rare in the literature and thus provides us important and valuable insights into how different firms are influenced across

numerous countries and allows us to draw recommendations for strategy, policy and areas for future research.

Our third contribution lies in the use of quantile regression estimation, which can illustrate potential differences in the impact of regional differences across the entire firm growth distribution. The few studies that explore the importance of location effects on firm growth (Hoogstra and van Dijk, 2004; Audretsch and Dohse, 2007) focus on the impact on a narrow set of regional characteristics on all firms in the sample. This means that such findings are only valid for the average firm in the region instead of investigating separately the firms, which are at different stages of the growth distribution and firm size categories. This is a crucial limitation in the literature, because regional characteristics may exert a different effect for the average firm as opposed to firms that are growing at different levels and are of different sizes (Geroski, 2000; Marsili, 2001; Coad, 2009). Thus, the emphasis on the entire growth distribution is particularly important in the context of growth studies and the policy attention towards HGFs who are at the upper part of the growth distribution (Coad and Rao, 2008; Crespo-Cuaresma et al. 2011; Duschl, 2016).

Our results indicate that firm growth depends not only on the firm-specific characteristics but also on significant differences in how the three regional factors impact on firms. Two main findings emerge. First, the role of social, economic and institutional determinants differs as we move across the various quantiles of the conditional growth distribution. HGFs seem to be able to better identify opportunities and exploit the advantages offered by a stronger provision of capital and knowledge resources compared to slower growing firms. Similarly, demand conditions exert a progressively important role towards higher quantiles and the same is observed for urbanisation economies shaped by higher population density.

Second, the effect of regional characteristics is critically dependent upon the size of the firms. Small firms are found to significantly benefit from increasing population density, whose impact is especially strong at a higher rate of growth. Quality of government also positively affects small firms, but it is not found to be significant for larger firms. Yet, there is weak evidence of a positive effect for large HGFs. More generally, regional effects seem to be progressively less clear for increasingly larger firms. In this sense, our results underline an important role for regions not just for

entrepreneurship and new firm creation, but for fostering and supporting growing small firms as well. Thus, our results point to significant differences in the effect of regional institutional, economic and social characteristics on firm growth in different size groups and across different rates of the growth distribution.

This paper proceeds as follows. The next section outlines the literature on firm growth, our theoretical framework and hypotheses. Section 3 describes the empirical research design, data and variable discussion. Section 4 presents the results and discussion of the findings with regards to advancing the literature on the effects that region-specific determinants may have on firm growth. Section 5 provides concluding remarks and outlines the limitations of the study.

2. Literature review and theoretical focus

The growing literature on small business economics and entrepreneurship has since the early 1990s focused on understanding the factors that allow and lead certain firms to grow very quickly (Storey, 1994; Davidsson and Henrekson, 2002; Delmar et al., 2003). In understanding the nature and characteristics of such exceptional firms, the literature has identified a number of stylised facts, which HGFs appear to have in common (see survey by Henrekson and Johansson, 2010). The theoretical underpinning of most of this work is theory of the firm and the RBV as the theoretical lens through which high-growth is explained. As a consequence, most of the stylised facts on HGFs revolve around firm-level characteristics or relationship between firm networks.

For example, Levie and Lichtenstein (2010) suggest that firms exist within a network of beliefs, relationships, systems and structures, and that it is a firm's capability to manage and capitalise on these potential assets that may determine performance. This reflects a common underlying element in regional studies related to the associational nature of regional systems, where economic development significantly depends on inter-firm interactions and connections through traded and untraded interdependencies that define localised associative capabilities (Camagni, 1991; Storper 1997; Cooke and Morgan, 1998; Capello and Faggian, 2005). The importance of local embeddedness is further reinforced by the often tacit and sticky nature of knowledge, which is reflected by the spatially bounded character of knowledge spillovers (Jaffe et al., 1993; Sonn and Storper, 2008; Camison and Villar-Lopez, 2012). This work builds on the

conceptualization of regions as nodes of interaction and connectivity that defines the vast literature on business clusters, agglomeration economies and regions as supply architecture of the learning economy (Porter, 1990; Camagni, 1991; Storper, 1997; Cooke and Morgan, 1998; Henry and Brown, 2006).

We argue that relying solely on the RBV and inter-firm interactions of embedded firms in close proximity to explain firm growth, neglects the region-specific factors that firms may significantly draw on in order to grow fast. Drawing on institutional theory, Kostova and Roth (2002) show that there are the varying institutional characteristics of countries that can impact firms differently. Indeed, prior to the renewed interest in testing for how institutions impact on firm behaviour and growth, there has a wide literature on how institutional quality impacts macro-economic performance and the economic development of countries (see Babecky and Campos, 2011; Efendic et al., 2011). Improving institutions reduce transaction costs, investment risk and overall enhance business opportunities, which ultimately lead to generating greater returns to firms (Dreher et al., 2007; Boerner and Hainz, 2009).

Considering the literature on internationalisation shows how firms operate in complex environments characterised by multiple, diverse and sometimes conflicting institutional and cultural factors (Pereira and Malik, 2015; Hughes et al., 2017). Similarly, studies that investigate the relationship between institutional reforms and firm performance indicate that not all firms benefit to the same extent following institutional reforms to improve the quality of institutions in which firms operate (Cuervo-Cazurra and Dau, 2000; Driffield et al., 2013; Kafouros and Aliyev, 2016). Based on this long-standing and renewed emphasis that "institutions matter" for firms and the countries in which they operate, it is surprising that there is relatively little micro-level investigation of the perceived mechanisms linking different factors of regions with firm growth potential, less still that which examines these impacts on different types of firms.

In this paper, we rely on the RBV and complement it with the institutional theory to enhance our analysis and understanding of what drives firm growth in the different regions of Europe. We, specifically, refer to three components of institutional theory, which encompass i) the social structures of regions, ii) the economic environment of regions and iii) the institutional characteristics of regions. It is important

that our choice of the factors for each component is not exhaustive and rather based on data availability, which nevertheless allows us to undertake a meaningful analysis at these three levels. In the following sections, we discuss each level and the corresponding literature strand, which leads to our overarching theoretical framework that guides the framing of our study[iii].

2.1 Institutional characteristics

The first element of our conceptual framework is defined by the institutional setting. Indeed, the role and quality of the local government has been identified as an essential element in concepts such as industrial districts and learning regions (Porter, 1990; Morgan, 1997). Government institutions may support the organisational mechanisms and the set of traded and non-traded interdependencies that facilitate and reinforce the flow of information across regional relational structures. While country-level studies have long supported the importance of institutional factors for economic development (Hall and Jones, 1999; Rodrik et al., 2004), recent data availability on the quality of government at the regional level has allowed scholars to empirically test their contribution with respect to regional economic and innovative performance (Rodríguez-Pose and Di Cataldo, 2015; Rodríguez-Pose and Gacilazo, 2015).

Pereira and Temouri (2018) show for Central and Eastern European countries that an improvement in a country's institutional environment impacts positively on the likelihood of firms becoming HGFs. In the context of firm growth, higher quality of institutions may ease imperfectly functioning markets and strengthen associative capabilities (Cooke and Morgan, 1998), improving identification of the range of external services and complementarities necessary for realising growth potential as well as information on business opportunities. Thus, the role of government may be especially important for smaller firms that are more embedded in the local environment to counterbalance the lack of internal competences and resources, and it may be most effective for firms with lower search and innovative capabilities (Hoffman et al., 1998). This is reflected by the delivery of public policy, with small firms receiving increasing policy support in the last decades across the EU (Storey, 1994; McCann and Ortega- Argilés, 2016). This leads to the following hypothesis:

Hypothesis 1a: *The stronger the institutional conditions of a region, the higher the likelihood of firms achieving higher firm employment growth*

2.2 Social characteristics

The second element in our conceptual framework is represented by the well-known concept of agglomeration economies. Two related but different forces can be identified. The first is represented by urbanisation economies, which are usually defined by business activities being located in large cities or, more generally, regions with higher population density. As such, this type of agglomeration externality is considered independently from industry structure (Frenken et al., 2007; Buerger et al. 2012). Densely populated agglomerations have been associated with higher firm productivity and innovation (Rosenthal and Strange, 2004; Melo et al., 2009). This is usually connected to the positive relationship between population density and more intense interactions across economic agents (Ciccone and Hall, 1996; Combes et al., 2012), which plays a significant role on the spatial transmission of knowledge, as well as a larger pool of skills available and thickness in the labour market (Krugman, 1991). High population density reflects areas that are characterised not only by a larger number of firms, but also other organisations such as universities, trade associations or other communities and local institutions (Frenken et al., 2007; Storper, 1997). A denser web of formal, informal and accidental interactions increases the level of communication across economic agents, resulting in a more sustained flow of knowledge exchange, learning and business opportunities (Saxenian, 1996; Storper and Venables, 2004; Boschma, 2005).

Acs and Mueller (2008) and Anyadike-Danes and Hart (2012b) hint at the presence of learning opportunities defined by high density which may be particularly important for HGFs. Collective knowledge and the resulting sustained stream of external knowledge opportunities have often been associated with the entrepreneurial stage of firms and thus high density may be more important for smaller firms (Acs et al., 2009). More generally, scholars have emphasised the stronger connection between new firm formation and the regional environment (Reynolds, 1994; Armington and Acs, 2002; Fritsch and Storey, 2014). Yet, the effect of regional determinants may exert an effect that goes beyond this first stage and may be especially important for firms that

rely on or are more embedded within their regional context, with models of small business growth based on the localised nature of knowledge spillovers suggesting a similar argument (Audretsch, 2005; Audretsch and Lehmann, 2005).

The discussion on collective learning and localised associative capabilities, as well as the role and structure of knowledge spillovers, is inherently connected to the debate on the characteristics of agglomeration economies. Previous studies have explored co-location following two often-contrasting perspectives, i.e. specialisation versus Sector diversification (for a review, see Beaudry and Schiffauerova, 2009). On the one hand, co-location of firms operating within the same industry is suggested to foster economic activity through a larger and more efficient labour market pooling and the presence of specialised suppliers and the intra-sector diffusion of knowledge spillovers. This type of externalities is referred to as localisation economies or Marshall-Arrow-Romer externalities. On the other hand, the importance of Sector diversification is explained by Jacobs externalities, defined by the presence of inter-industry spillovers. While localisation economies may be associated with incremental innovation and spillovers among similar firms, potentially leading to lock-in positions, the variety and heterogeneity in spatially embedded and diverse industries may lead to novel recombination of knowledge and ideas promoting innovation and, ultimately, employment growth (Glaeser et al., 1992). Empirical findings at the firm level are still limited. Duschl et al. (2015) show that being embedded into specialized regions might hamper employment growth, with a firm's growth prospects being more likely to be hindered by agglomeration of own-industry employment. They also note this effect may depend on the industry's age. Similarly, Hoogstra and van Dijk (2004) suggest a complex role for agglomeration economies, finding contrasting effects across different industries. This leads to the following hypothesis:

Hypothesis 1b: *The stronger the social conditions of a region, the higher the likelihood of firms achieving higher firm employment growth*

2.3 Economic characteristics

Considering the third element of our conceptual framework, the economic literature has long emphasised the role of human and physical capital as crucial elements in growth

patterns and economic development (Mankiw et al., 1992; Romer, 1990). Recent evidence offered at the regional level (Badinger and Tondl, 2003; Crespo-Cuaresma et al., 2011) shows that the level of capital accumulation is connected to the investment and output in technological activities by the presence of high skilled human capital. This leads to regions offering stronger factor conditions for the creation of new knowledge as well as higher productivity.

The importance of learning and innovation is emphasised by the models on firm growth (Aghion and Howitt, 1992; Pakes and Ericson, 1998). As suggested by Porter (1990), the presence of these elements may be seen as critical determinants of regional competitiveness and innovation due to the propensity of knowledge to spread, or spill over, leading to localised increasing returns (Romer, 1990; Porter, 1990; Jaffe et al., 1993), thereby fostering firm growth. On the other hand, as factor conditions increase, labour costs necessarily increase to reflect higher levels of productivity and living costs in the region. This will lead to decreasing returns for firms that cannot fully exploit the advantages offered by a stronger provision of capital and knowledge resources.

This inverted U-shaped relationship be may ultimately defined by firm size and rate of growth. We would expect larger firms to be able to benefit from the advantages of increasingly higher regional factor conditions, as larger resources and efficiency may counterbalance the higher costs associated. This may also be the case for HGFs, whose remarkable growth may be associated to a greater ability to identify opportunities, both internally and externally, leading to better absorptive capacity with respect to the flow of information and knowledge available where they are located. Indeed, innovativeness has been found to be of crucial importance for HGFs (Coad and Rao, 2008; Segarra and Teruel, 2014). Thus, the level of capital and knowledge resources offered by regions with increasingly stronger factor conditions can be exploited by HGFs as a platform to foster their remarkable growth over time.

Regions characterised by a stronger local demand may also support firm growth. Previous studies have underlined the importance of increasing demand for goods and services connected to population growth for new firms (Reynolds, 1994; Armington and Acs, 2002). In the same way, increasing population may result in a larger market and a more developed provision of intermediate goods and services

(Krugman, 1991), thereby offering a more sustained presence of business opportunities for firm growth, especially for those more interwoven with the regional economy or with stronger capabilities to act upon such opportunities, like HGFs. This leads to the following hypothesis:

Hypothesis 1c: *The stronger the economic conditions of a region, the higher the likelihood of firms achieving higher firm employment growth*

2.4 Impacting Factors

We combine these three strands of literature in our theoretical framework as depicted in Figure 1. We utilise the RBV as a lens to argue that at multiple levels (macro, meso and micro) a 'configuration' or 'bundle' of institutional, economic and social factors collectively lead to a competitive advantage for achieving high growth (Barney, 1991; McKelvie and Davidsson, 2009). These factors, as the RBV argues, have to be valuable, rare, inimitable and organised (VRIO) to gain this competitive advantage. We further develop on the study by McKelvie and Davidsson (2009) who highlight the need for further understanding of how firms access key resources and capabilities to achieve competitive advantage. As depicted in figure 1, our study includes under social factors variables such as Population Growth (macro) and Population Density (macro); under economic factors we include variables such as Fixed assets (micro), Intangibles (micro), ROA (micro), Firm size (micro), Concentration (meso), Foreign Ownership (micro), Firm age (micro), and Sector diversity (meso); under institutional factors we include Quality of Government (macro) and Tertiary education (macro). Each of these variables is defined in the next section.

(Insert Figure 1)

With regards to firm-level aspects, we include two dimensions, which the literature has highlighted as important distinctions across HGFs. First, the literature on small firm growth shows that small and medium sized HGFs are overrepresented among all HGFs, and that larger HFGs are smaller in number (Coad et al., 2014). The literature has so far linked HGFs to wider economic and social outcomes, such as the growth of other firms in the same locality (Mason et al. 2009) and particularly in

industrial clusters (Stam and Bosma, 2015). Although, this offers evidence that HGFs are growing in certain regions, such as business clusters (Pereira, Temouri and Patel, forthcoming) and that firms in the supply chain may benefit from the association with HGFs in the same locality (Roper and Crone, 2003), the explanation of which locational conditions impact on what type of firms, such as firm size or initial growth level is open for debate.

Therefore, when it comes to the question of regional characteristics, we argue that SMEs may benefit more from better institutional, economic and social conditions of a region compared with larger fast-growing firms that may have already gained from the regional characteristics in previous periods or are less dependent on the resources of the region where they are located due to operating in multiple locations (including international markets).

The second issue is the fact that firms grow at different levels at any point in time. This means that the few studies that explore the importance of location effects on firm growth (Hoogstra and van Dijk, 2004; Audretsch and Dohse, 2007) are only valid for the average firm in the region instead of investigating separately the firms, which are at different stages of the growth distribution and of different firm size categories. We address this limitation by the literature by using the arguments that regional characteristics exert different magnitudes for the average firm as opposed to firms that are growing at different levels and are of different sizes (Geroski, 2000; Marsili, 2001; Coad, 2009). Thus, we follow the emphasis on analysing the entire growth distribution (see Coad et al, 2014; Crespo-Cuaresma et al. 2011; Duschl, 2016). Therefore, analysing the impact of any contextual variable on firm-growth needs to explicitly distinguish between firm size and the particular level of growth that the firm is currently experiencing. This leads to the following hypothesis:

Hypothesis 2a: *The influence of institutional, economic and social conditions of a region on a firm's employment growth is higher for small and medium sized firms than for large firms.)*

Hypothesis 2b: *The influence of institutional, economic and social conditions of a region on a firm's employment growth is higher for HGFs than for slower growing firms.*

3. Data and research design

Our data are drawn from two main sources. The first source is the commercially available database ORBIS, which provides detailed information on company profiles, including profit and loss accounts, balance sheets and other financial data[iv]. The scope of the ORBIS database for territorial analysis relies on postcode information on company location, which allows us to match each observation to key regional institutional, economic and social characteristics at the NUTS-2 level across EU countries. The second source is Eurostat, where we collected the variables at the NUTS-2 level for all regional indicators.

Our sample includes all firms with at least 10 employees[v] from 14 EU countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom), resulting in a dataset comprising almost 240.000 firms across 174 NUTS-2 regions for the time-period 2010-2013. Our choice of countries is based on the availability of all variables that are needed for our analysis as well as the NUTS-2 level variables that are well covered for these 14 European countries.

We distinguish between three categories of firms based on the number of employees in the base year 2010: small firms (10-49 employees) which represent 67% of the total sample, 25% are medium firms (50-250 employees) while large firms (250+ employees) account for the remaining 8%. Thus, the composition of our sample across firm size shows that 93% coverage for SMEs in our sample compares well with an average of 97%[vi], which is common in many European population statistics. A breakdown across countries is reported in Table A1[vii]. For a more detailed comparison between Orbis representativeness vis-à-vis national population statistics, please see Ribeiro, Menghinello and K. De Backer (2010).

In order to examine firm and regional factor determinants on growth in line with our conceptual framework, we estimate the following model:

$$\sqrt[3]{\frac{Employment_{it}}{Employment_{it-T}}} - 1$$
$$= \alpha + \beta_1 \text{Firm characteristics}_{\text{it-T}} + \beta_2 \text{RFC}_{\text{it-T}} + \beta_3 \text{POPULATION GROWTH}_{\text{it-T}} + \beta_4 \text{SECTOR DIVERSITY}_{\text{it-T}} + \beta_5 \text{POPULATION DENSITY}_{\text{it-T}} + \beta_6 \text{QUALITY OF GOVERNMENT}_{\text{it-T}} + \delta_i + \varepsilon \quad (1)$$

where:

$\sqrt[3]{\frac{Employment_{it}}{Employment_{it-T}}} - 1$ is our dependent variable calculated as the average annualised enterprise growth across a three-year period, where t is 2013 and T is 2010, as defined by the guidelines of EUROSTAT and OECD (Eurostat-OECD, 2007). All explanatory variables are, therefore, defined at the initial period t-T, which is 2010. The rationale for this approach is twofold. First, as noted by Coad et al. (2014), looking at the compound annual growth rate over a three-year period smooths out volatile year-to-year variation along growth trajectories. Second, this definition is commonly used in both firm growth literature and policy documents (Eurostat-OECD, 2007; Henrekson and Johansson, 2010), offering consistency with previous analyses across EU countries. Different variables can be used as metrics for growth. For availability and comparability, the Eurostat-OECD manual indicates that either employment and turnover are preferred. Thus, in this paper, we focus on employment[viii] as this allows a better conceptual fit with our available regional indicators and it is often of greater interest for policy. In line with the guidelines by Eurostat-OECD (2007) and previous literature, we note any firm with less than 10 employees in the initial period 2010 are removed from the dataset to avoid micro enterprise growth bias.

Our independent variables in the model can be divided in two parts. The first set of explanatory variables are used to represent our main economic, social and institutional characteristics of each region. These include: *Factor conditions* are proxied by using three measures together, namely on capital accumulation (i.e. GDP) as well as education (i.e. tertiary) and technology (i.e. patents). Regional gross domestic product (GDP) is defined at purchasing power parity (PPP), per capita. We also

consider the percentage of people between the age of 24 and 65 with tertiary education, which is a standard measure for educational attainment, together with the number of patents per capita to proxy the level of technological intensity in the region. In line with previous analyses (OECD, 2009), these elements are found to be strongly inter-connected at the regional level. In our sample, they present a very high correlation, consistently above the threshold of r=0.7. In order to avoid multicollinearity, we define factor conditions using principal component analysis based on these three measures, which generates one component explaining 64% of the variance.

Population growth is adopted as proxy for regional demand growth. In line with previous literature (Reynolds, 1994), it is calculated as the average growth over the preceding 3 years before T. *Sector diversity* is a measure of the diversity in terms of employment for each region across broadly defined, and therefore different, sectors. Formally, the index is defined as the entropy index at the 1-digit level calculated as follows:

$$divers_r = \sum_{s=1}^{N} P_s \log_2 \left(\frac{1}{P_s}\right) \quad (2)$$

where $P_s = E_{sr}/E_r$ is the share of each 1-digit sector *s* in total employment for the region *r*;

Population density is defined by NUTS-2 regions as inhabitants per km², log-transformed. *Quality of Government* is a variable that proxies the quality of formal institutions in the region. This index is obtained by normalising 16 different measures reflecting the central concepts ofimpartiality, corruption and quality based on both experience and perceptions of respondents for three key public services: education, healthcare and law enforcement. As these individual indicators are highly correlated, the composite index employed in the analysis reflects institutional quality as a latent multi-dimensional concept. Data for this variable is obtained from the Quality of Government EU Regional dataset (Charron et al., 2014; Charron et al., 2016). As underlined by the literature (Rodríguez-Pose and Di Cataldo, 2015; Rodríguez-Pose

and Gacilazo, 2015), this measure provides a consistent and comparable proxy across EU regions allowing to capture significant differences at the sub-national level[ix].

The second set represents a number of firm characteristics, which includes *fixed assets* representing all tangible assets or property such as buildings, computer equipment and machinery, defined in the firms' balance sheet account as the sum of fixed assets and current fixed assets. *Intangible fixed assets* represent all intangible assets including formation expenses, research expenses, goodwill, development expenses and all other expenses with a long-term effect and it is often used as an indicator of firms' wider innovative capacity (Du and Temouri, 2015). It is a financial label of the balance sheet account. *ROA* represents the return on total net assets, which is used as a proxy for management efficiency and ultimately the profitability of firms in relation to their overall resources; *Firm size* is the log of the total number of full time employees of the company (personnel) in period t-T. *Concentration* is used as a proxy for the level of industry concentration, calculated as the market share squared of firms across two-digit industries. *Foreign Ownership* is a dummy variable equal to 1 for firms that are owned to at least 10% by an ultimate foreign owner and 0 otherwise; *Firm age* represents the age of a firm calculated starting from the year the company has been incorporated. Finally, δ_i represents two sets of dummy variables to control respectively for sectoral effects (Geroski and Toker, 1996; Duschl et al., 2015) and country-level fixed effects.

3.1 Estimation technique and summary statistics

The analysis is carried out using standard ordinary least-square (OLS) regression as well as quantile regression[x]. In particular, the use of quantile regression in the context of firm growth analysis offers significant advantages, as discussed in the firm-growth literature (Coad and Rao, 2008; Crespo-Cuaresma et al., 2011; Du and Temouri, 2015). Similarly, recent evidence points to a significant effect of regional characteristics on extreme growth events at the firm level (Duschl, 2016). While OLS regression estimates the mean of the growth rate conditional on the explanatory variables, quantile regression is a semi-parametric method that allows estimating the conditional quantile of the growth rate across the entire conditional distribution of the dependent variable, with no assumption on the distribution of the error term. Also, quantile regression is

more robust than OLS in the presence of non-normal errors - as in heavy-tailed distributions - and outlying observations, which are common when observing firm growth rates (Coad, 2009).

As Coad and Rao (2008) point out, this approach allows to explore the effect of the covariates of interest beyond the 'average firm', whose limited growth may be the result of a wide set of specific factors. Exploring the heavy tails of the growth distribution, quantile regression allows to model the effect of regional determinants for low performing firms as well as firms exhibiting increasingly higher growth rates. This allows us to investigate in more detail the small fraction of high growth firms, defined as firms in the upper decile of the growth distribution, in line with previous literature (Coad and Rao, 2008). This corresponds to 11% of firms in our sample, fairly in line with Eurostat data that indicate 10% of firms with growth over 10% across three years in 2013. Considering the Eurostat-OECD definition with a threshold at 20%, we find around 4% of firms in our datasetxi reflecting previous studies with figures between 4.6% and 6% (Anyadike-Danes and M. Hart, 2012; Du and Temouri, 2015). We also observe the well-known variation in HGFs at both threshold levels across countries in our dataset, reported in Table A1, broadly in line with Eurostat data.

Table 1 reports mean and standard deviation for firm growth values across different quartiles by firm size. We observe that the standard deviations are higher than the mean values, indicating the presence of significant variation in growth rates, which is in line with previous studies (Coad, 2010; Coad et al., 2014). Figure 2 reports the kernel density plot for firm growth across the whole sample, and by firm size, showing the growth distribution has the expected large mass in the middle, with values centred around 0, and fat tails.

(Insert Table 1)

(Insert Figure 2)

Table 2 offer descriptive statistics for firms in our sample. Firm level variables show that increasing resources and Firm age are characteristics of larger firms, as well as slightly higher returns. Similarly, data for regions underline the well-known differences across European regions for economic conditions, as well social and institutional characteristics. According to the correlation matrix shown in Table 3, we find expected correlations between fixed assets and firm size, and across regions with

higher levels of factor conditions and both measures of population density and quality of government. However, Variance Inflation Factors are consistently under the conservative threshold of 5, suggesting multicollinearity is not an issue in the data and subsequent analysis.

(Insert Tables 2)

(Insert Tables 3)

4. Results and discussion

Considering the impact of firm categorisation (H2a) and initial firm growth decile (H2b) on institutional, economic and social factors (H1a, b, c) we present our results in a way that best captures the narrative in our conceptual framework (figure 1). We, thus, report the results for the regression analysis separately for small (table 4), medium (table 5) and large firms (table 6). For each of these tables of results, column 1 shows the estimates from OLS regression, while columns 2 to 5 present respectively quantile regression estimates for the first, second and third quartile as well as the upper decile of firm employment growth across the three-year period, in line with previous literature (Coad and Rao, 2008; Coad, 2010).

Small firm results

The findings for small firms (<50 employees) are consistent across both OLS and quantile regressions, especially when considering the results at the median value (Column 3). However, exploring results for different quantiles highlights important differences, especially for the upper quartile associated with HGFs. In particular, variables reflecting regional institutional, economic and social characteristics, our key findings from the analysis are that, alongside firm level variables, regional characteristics significantly explain firm-growth, particularly for HGFs who seem to be able to better identify opportunities and exploit the advantages offered by a stronger provision of capital and knowledge resources.

Our results indicate an inverted U relationship between factor conditions and firm growth. This points to the positive effect of a stronger regional economy in terms of capital and knowledge resources but also the presence of decreasing returns associated with increasingly higher competition and costs associated with highly

developed regions. Across the growth distribution, the effect for *factor conditions* progressively changes and we observe the sign of coefficients for this variable to reverse for higher quantiles, suggesting small HGFs may indeed benefit from stronger *factor conditions* associated to innovation and capital opportunities despite the related higher costs. The importance of knowledge resources and human capital is further reinforced by the findings on urbanisation economies, shaped by higher population density, which are traditionally linked to knowledge spillovers and spatially bounded flows of information or the rise of the creative class (see e.g. Hendry and Brown, 2006). Our results also suggest a denser web of formal and informal interactions may effectively sustain business opportunities and growth. This finding links well with the study by McKelvie and Davidsson (2009) who find that human capital and financial capital play a large role in determining dynamic capabilities in Swedish small sized firms leading to growth. However, our findings complement these findings showing that the impact is progressively important towards higher quantiles in the firm growth distribution. We also find a positive and significant effect of population growth, indicating the important role of regional demand effects often discussed in regional economics literature (Reynolds, 1994). Both, population density and population growth are still positive for small HGFs, but the magnitude of the coefficient is considerably higher, indicating that such trajectories depend strongly on local demand and a dense network of interactions.

The coefficient on *Sector diversity* is significant but presents a negative sign. However, previous studies note the effect may be industry specific[xii] or related to their lifecycle. (Hoogstra and van Dijk 2004; Duschl et al., 2015). We also note our data allowed to capture *sector diversity* only at one-digit industry code, effectively reflecting unrelated variety which has been associated with negative effects on firm productivity (Aarstad et al., 2016). More refined classifications may lead to different results. Across higher quartiles, *Sector diversity* is still negative, but it is no longer significant, reinforcing the view its effect may be quite heterogeneous.

Considering institutional determinants, we find a significant and positive effect on firm growth for the quality of government. This complements recent findings on the relationship between institutions and regional innovativeness and growth (Rodríguez-Pose and Crescenzi, 2012). At the same time, we note these results do not

allow us to disentangle the extent to which institutional factors directly affect firm growth as opposed to a selection effect where higher quality of government may attract firms with more growth potential[xiii]. The latter would indicate a more indirect relationship. *Quality of government* is increasingly important as we move from the first to third quartile, but it is no longer significant for the upper decile, indicating how the role of institutions for HGFs may be less clear. We argue that HGFs may be less affected by regulation as compared with the average firm in a region (Lee, 2014).

The strong link between small firm growth and regional characteristics can be further examined by estimating separately independent firms as opposed to foreign-owned enterprises (FOEs), which are often identified by the literature as being reliant on their parent firm for capital and knowledge transfers as well as other firm-specific assets (Luo, 2005; Mudambi and Navarra, 2015). To explore this, we have run our analysis separately for the two groups. Results are reported in the Appendix, in Tables A.2 and A.3. The results indicate that regional determinants of firm growth are quite different across the two groups. Most of regional variables are no longer significant in the case of FOEs, confirming previous evidence (Rodríguez-Pose and Crescenzi, 2008; Driffield et al., 2013) of a weaker connection with regional factor conditions, as well as other social and institutional determinants. The exception to this is a positive effect of population density for HGFs, similarly to large firms as discussed below, suggesting this specific subset of firms may still be engaged with localised learning opportunities and the positive effects of urbanisation economies. Conversely, our previous findings are clearly confirmed for independent firms underlining the importance of localised demand, institutional quality and knowledge created available within the region.

With regards to the firm-level variables, our findings are in line with previous research. Our results confirm that the amount of assets, both fixed and intangible assets are exerting a positive effect on growth. Similarly, the expected positive effect is found for ROA, a common firm performance measure. Firm size and age are another set of explanatory variables that have been extensively observed in previous research (Sutton, 1997; Coad, 2009). In line with this, our findings indicate younger and smaller firms may experience higher growth rates. The most interesting difference can be seen across the quantiles, where we observe the increasing importance of intangible assets for higher deciles, whereas the coefficients for fixed assets indicate

a smaller effect. This indicates the nature and importance of knowledge intensive assets, such as R&D and innovation activity in contributing to higher growth rates compared with more tangible assets, such as machinery and other equipment. This is relevant across firm size and suggests that knowledge and intellectual property assets may be particularly important determinants of growth, even for larger firms, which complements results found in studies on innovation capabilities in industrial districts by Camison and Villar-Lopez (2012).

(Insert Table 4)

Medium and large firm results

When we consider medium firms (50 to 249 employees in 2010) and large firms (>=250 employees in 2010) shown in table 4 and 5 respectively, we find that there are many similarities in the effects of firm-level determinants of growth, but the importance of regional characteristics is increasingly heterogeneous[xiv]. In particular, differences for regional determinants of firm growth are increasingly evident once we turn our attention to quantile regression estimates. The level of regional development and knowledge available is still important, but it mostly seems to be relevant for higher levels of *factor conditions* and upper quartiles of firm growth distribution. In this sense, medium and large firms seem to be able to exploit advantages of a stronger provision of factor conditions, perhaps offsetting the effects of increased concentration and costs through higher efficiency and economies of scale in production. In line with this, medium and large firms in the first quartile still present an inverted U relationship with factor conditions. The strength of growth in local demand, as captured by population growth, is still positive for medium firms, but it is no longer significant for large ones whose markets may be less connected to the regional economy. This may also explain the negative coefficient found for population density in the lower quartiles for both large and medium firms, as limited reliance on local untraded inputs and informal knowledge flows no longer counterbalance higher congestion costs. For both groups, *Sector diversity* in the industrial composition is not significant. Similarly, except for the OLS estimates, quality of government is no longer statistically significant for these firms. Once again, there are important differences in the upper decile, at least for large firms, where we find weak evidence of a positive effect for Quality of Government and density suggesting the importance of strong institutions and learning regions for this

group of firms that are likely to be more connected to the global knowledge economy. Overall, these findings suggest larger firms, with more established markets and assets, are less dependent on the resources of the region where they are located.

In terms of firm level determinants, internal resources (fixed and intangible assets) and ROA exert a positive effect for both medium and large firms, but we note the coefficient for fixed assets declines moving to higher quartiles and it turns negative for the higher quartile for large firms. As for the firm size effect discussed in the literature (Coad, 2009), this may point to decreasing returns related to market maturity and loss of dynamism within these firms. Conversely, observing the role of intangible assets we still find an increasingly stronger effect moving towards the higher quartile, and especially for the upper decile. This suggests knowledge and intellectual property assets may be particularly important determinants of growth, even for larger firms.

Being a foreign firm does not seem to have a significant effect for medium firms, while there is a negative effect for large firms, which may reflect different core objectives for large foreign subsidiaries focused on efficiency and knowledge seeking rather than growth, as discussed in the international business literature (Dunning, 1993). Similarly, a positive effect is found for higher *market concentration* within large firms from the third quartile, reflecting advantages arising because of capital intensity and economies of scale (Acs and Audretsch, 1987). As for small firms, and consistently with the literature (Sutton, 1997; Coad, 2009), firm age and employment present a negative and significant relationship with firm growth.

(Insert tables 5 and 6)

In summary, our results indicate that firm employment growth is significantly defined by regional factors according to our conceptual framework, which captures configurations of institutional, economic and social characteristics of regions at the micro, meso and macro level (H1a, b, c). However, our results point to significant differences of these regional effects, according to which size category a firm belongs to as well as the initial growth decile that the firm shows. It is important to mention an important issue, whereby better performing firms that are expecting to grow faster could seek to locate to better locations within a country to help them in their objective. In the set-up of our analysis we certainly have controlled for firm-level drivers of high growth apart from the regional characteristics. Moreover, our data covers one period of high-

growth status where we observe a firm's location at the beginning of the period. However, it is a worthwhile aspect for future research to control for location change information and thereby focus on an analysis of how small entrepreneurial firms decide on their location decision and how that in turn helps them grow.

5. Conclusions, Limitations and Future research directions

Firm growth remains a complex area of research due to the high level of heterogeneity that characterises firms and their dynamics. This paper contributes to the strand of research on firm growth by theoretically deriving a conceptual framework, which brings together insights from the RBV and institutional theory to explain firm growth. Based on our conceptual framework, we argue that stronger regional institutional, economic and social factors are an important determinant for firm-growth, alongside internal firm efforts to grow. However, the stronger regional characteristics are more likely to impact upon SMEs than large firms, whereas faster growing firms of any firm size are able to better exploit advantages present in stronger regional settings.

Our analysis shows that small firm growth is significantly influence by the local economy, with population density and growth playing an important role as well as the quality of government. Also, a quadratic effect is found for the level of capital and knowledge that is present in a region. Conversely, regional effects are less clear for increasingly larger firms. All effects seem to strongly depend on the firm rate of growth.

In particular, two main findings emerge. First, the role of regional determinants differs as we move across the various quantiles of the conditional growth distribution. HGFs seem to be able to better identify opportunities and exploit the advantages offered by a stronger provision of capital and knowledge resources. Similarly, demand conditions exert a progressively important role towards higher quantiles and the same is observed for urbanisation economies shaped by higher population density.

Second, the effect of regional characteristics is critically dependent upon the size of the firms. In this sense, our results underline an important role for regions not just for entrepreneurship and new firm creation, but for fostering and supporting growing small firms as well. In particular, small firms are found to significantly benefit from increasing population density, whose impact is especially strong at a higher rate

of growth. Quality of government also positively affects small firms.Yet, there is weak evidence of a positive effect for larger HGFs. More generally, regional effects seem to be progressively less clear for increasingly larger firms.

These findings must be considered in light of the limitations of this research, which in turn opens up potential avenues for future research. First, our data captures one high-growth status period (2010-2013), which if extended to more periods could allow future research to focus on an analysis of how small entrepreneurial firms decide on their location decision and how that in turn helps them grow. Another limitation is that our data do not allow us to consider the potential strength of localised inter-firm interactions and connections of the firms and their embeddedness within the region. Also, we cannot control for the industry life cycle in agglomeration economies, which may mediate the effect of sector diversification economies or other contextual factors such as technological differences (Duschl et al., 2015). Finally, as pointed out in the previous section, we cannot analyse in further detail the relationship between firm growth and regional institutions. Specifically, while we observe a positive link, our data do not allow us to separate the direct effect of institutional quality on firm growth and a selection effect of stronger regions attracting good firms. Further analysis should also explore a wider set of institutional variables. In particular, the paper did not explore potential effects of informal institutions such as social trust and openness in the local economy, especially amongst smaller firms. We underline this is an interesting and important direction for future research.

In general, access to longer panels and finer-grained data will potentially allow future research to conduct ever more detailed analysis on the interesting issues described above. Further, apart from quantitative analysis, research may also benefit from primary data that might be collected through the qualitative case study method. For example, providing a unique perspective on the social dimensions of locations on employment generation may be possible through more qualitative research techniques.

Nevertheless, this paper has important managerial and policy implications based on the findings of the study. From a policy and managerial perspective, it is important to realise which firms are mostly expected to benefit from the external environment which in turn can be planned via tailored policy reform by regional

governments and firm level strategy making by managers. From a theoretical perspective we extend the firm growth and HGF literature through the lens the RBV by extending it outside the firm and conceptualising a framework that captures the impact of institutional, economic and social determinants on firm employment growth at the regional level and for different types of firms.

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Table 1. Firm employment growth across size class

Firm growth	Mean	SD	Q25	Q50	Q75	Q90
Small firms (10-49)	-0.026	0.151	-0.077	-0.012	0.038	0.110
Medium firms (50-249)	-0.005	0.137	-0.042	0.003	0.047	0.111
Large firms (>=250)	-0.003	0.135	-0.036	0.005	0.048	0.107

Table 2. Descriptive statistics for firm-level and regional-level variables

	Mean	SD	Mean	SD	Mean	SD
Firm-level variables	10-49 employees		50-249 employees		>=250 employees	
Fixed assets	5208.80	80746.69	23980.65	336213.50	497943.90	4500711.00
Intangible assets	236.00	7287.60	1869.77	81958.03	126489.70	1555858.00
ROA	2.48	11.90	3.56	11.61	3.52	10.52
Firm size	20.85	10.46	105.39	50.21	2217.15	13171.21
Concentration	0.02	0.03	0.02	0.03	0.02	0.03
Foreign Ownership	0.17	0.37	0.27	0.45	0.34	0.47
Firm age	23.66	16.56	29.91	23.19	35.09	33.31
Regional-level variables						
GDP	28413.05	7677.07				
Tertiary education	28.08	10.07				
Patents/population	0.12	0.12				
Population Growth	0.01	0.01				
Sector diversity	1.95	0.07				
Population Density	696.98	1627.95				
Quality of Government	0.46	0.72				

Table 3. Correlation matrix

Firm growth	1	2	3	4	5	6	7	8	9	10	11	12
Fixed assets	0.11	1										
Intangible assets	0.09	0.50	1									
ROA	0.13	-0.06	-0.02	1								
Firm size	0.08	0.62	0.46	0.10	1							
Concentration	-0.01	0.04	0.05	0.01	0.06	1						
Foreign Ownership	0.04	0.04	0.06	0.10	0.12	0.01	1					
Firm age	0.02	0.28	0.09	-0.01	0.25	0.01	0.00	1				
Factor conditions	0.13	0.18	0.16	0.19	0.24	-0.01	0.06	0.13	1			
Population Growth	-0.05	-0.06	-0.09	-0.03	-0.13	0.01	-0.03	-0.10	0.24	1		
Sector diversity	-0.10	-0.09	0.00	-0.11	-0.14	0.02	-0.03	-0.10	-0.04	0.10	1	
Population Density	0.05	0.05	0.07	0.05	0.13	0.02	0.07	0.07	0.46	0.14	-0.08	1
Quality of Government	0.15	0.19	0.03	0.26	0.28	-0.03	0.13	0.13	0.47	-0.10	-0.29	-0.04

Table 4. Firm growth: OLS and LAD regression for small firms (10-49)

	OLS		LAD		LAD		LAD		LAD	
			Q25		Q50		Q75		Q90	
	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.
Fixed assets	0.0066***	(0.0003)	0.0065***	(0.0002)	0.0040***	(0.0001)	0.0039***	(0.0002)	0.0047***	(0.0004)
Intangible assets	0.0032***	(0.0002)	0.0016***	(0.0001)	0.0014***	(0.0001)	0.0023***	(0.0002)	0.0036***	(0.0003)
ROA	0.0098***	(0.0003)	0.0104***	(0.0002)	0.0069***	(0.0002)	0.0068***	(0.0002)	0.0087***	(0.0004)
Firm size	-0.0097***	(0.0008)	0.0025***	(0.0007)	-0.0029***	(0.0005)	-0.0101***	(0.0006)	-0.0191***	(0.0014)
Concentration	-0.0029***	(0.0004)	-0.0039***	(0.0004)	-0.0011***	(0.0002)	0.0004	(0.0003)	0.0024***	(0.0007)
Foreign Ownership	0.0071***	(0.0009)	-0.0002	(0.0008)	0.0034***	(0.0006)	0.0067***	(0.0008)	0.0138***	(0.0017)
Firm age	-0.0003***	(0.0000)	0.0002***	(0.0000)	-0.0002***	(0.0000)	-0.0007***	(0.0000)	-0.0013***	(0.0000)
Factor conditions	0.0041***	(0.0006)	0.0068***	(0.0005)	0.0020***	(0.0004)	-0.0003	(0.0005)	-0.0042***	(0.0010)
Factor conditions^2	-0.0016***	(0.0002)	-0.0025***	(0.0002)	-0.0005***	(0.0001)	0.0004**	(0.0002)	0.0020***	(0.0003)
Population Growth	0.0041***	(0.0010)	0.0024**	(0.0010)	0.0043***	(0.0007)	0.0059***	(0.0008)	0.0091***	(0.0017)
Sector diversity	-0.0176***	(0.0061)	-0.0137**	(0.0053)	-0.0112***	(0.0039)	-0.0041	(0.0051)	-0.0041	(0.0106)
Population Density	0.0014**	(0.0005)	-0.0018***	(0.0005)	0.0001	(0.0003)	0.0022***	(0.0004)	0.0063***	(0.0009)
Quality of Government	0.0044***	(0.0010)	0.0019*	(0.0010)	0.0020***	(0.0006)	0.0023***	(0.0008)	0.0021	(0.0017)
Constant	0.0252*	(0.0151)	-0.0670***	(0.0120)	0.0189**	(0.0088)	0.0909***	(0.0128)	0.1964***	(0.0279)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	159972		159972		159972		159972		159972	
R squared	0.065		0.058		0.032		0.034		0.044	

Significance levels: * p<.10 ** p<.05 *** p<.01

Table 5. Firm growth: OLS and LAD regression for medium firms (50-249)

	OLS		LAD Q25		LAD Q50		LAD Q75		LAD Q90	
	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.
Fixed assets	0.0060***	(0.0004)	0.0052***	(0.0002)	0.0023***	(0.0002)	0.0004*	(0.0003)	-0.0001	(0.0005)
Intangible assets	0.0028***	(0.0002)	0.0011***	(0.0001)	0.0012***	(0.0001)	0.0022***	(0.0002)	0.0037***	(0.0003)
ROA	0.0069***	(0.0004)	0.0061***	(0.0003)	0.0051***	(0.0002)	0.0054***	(0.0003)	0.0067***	(0.0006)
Firm size	-0.0117***	(0.0012)	-0.0059***	(0.0008)	-0.0041***	(0.0006)	-0.0054***	(0.0009)	-0.0135***	(0.0019)
Concentration	-0.0026***	(0.0006)	-0.0034***	(0.0004)	-0.0011***	(0.0003)	-0.0007	(0.0004)	0.0013	(0.0009)
Foreign Ownership	0.0016	(0.0012)	-0.0019**	(0.0008)	-0.0011*	(0.0007)	0.0009	(0.0010)	0.0029	(0.0019)
Firm age	-0.0002***	(0.0000)	-0.0000	(0.0000)	-0.0001***	(0.0000)	-0.0003***	(0.0000)	-0.0006***	(0.0000)
Factor conditions	0.0042***	(0.0008)	0.0036***	(0.0006)	0.0011***	(0.0004)	0.0002	(0.0006)	-0.0019	(0.0012)
Factor conditions^2	-0.0015***	(0.0003)	-0.0012***	(0.0002)	-0.0001	(0.0002)	0.0004**	(0.0002)	0.0014***	(0.0004)
Population Growth	0.0080***	(0.0017)	0.0053***	(0.0013)	0.0033***	(0.0010)	0.0060***	(0.0013)	0.0072**	(0.0028)
Sector diversity	-0.0017	(0.0083)	-0.0140***	(0.0049)	0.0010	(0.0053)	-0.0121*	(0.0065)	0.0050	(0.0150)
Population Density	-0.0010	(0.0006)	-0.0027***	(0.0004)	-0.0011***	(0.0004)	-0.0002	(0.0005)	0.0007	(0.0010)
Quality of Government	0.0067***	(0.0020)	0.0015	(0.0014)	-0.0001	(0.0009)	-0.0013	(0.0013)	-0.0017	(0.0028)
Constant	-0.0145	(0.0188)	-0.0205*	(0.0110)	0.0022	(0.0114)	0.0830***	(0.0144)	0.1401***	(0.0328)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	61129		61129		61129		61129		61129	
R squared	0.062		0.05		0.029		0.030		0.040	

Significance levels: * p<.10 ** p<.05 *** p<.01

Table 6. Firm growth: OLS and LAD regression for large firms (>=250)

	OLS		LAD		LAD		LAD		LAD	
			Q25		Q50		Q75		Q90	
	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.	Coefficient	Robust Std. dev.
Fixed assets	0.0035***	(0.0008)	0.0044***	(0.0004)	0.0006**	(0.0003)	-0.0027***	(0.0005)	-0.0057***	(0.0008)
Intangible assets	0.0023***	(0.0003)	0.0009***	(0.0002)	0.0009***	(0.0002)	0.0019***	(0.0002)	0.0036***	(0.0004)
ROA	0.0065***	(0.0008)	0.0070***	(0.0005)	0.0050***	(0.0004)	0.0054***	(0.0005)	0.0050***	(0.0010)
Firm size	-0.0081***	(0.0013)	-0.0053***	(0.0006)	-0.0017***	(0.0006)	-0.0005	(0.0009)	-0.0017	(0.0014)
Concentration	0.0009	(0.0011)	-0.0023***	(0.0007)	-0.0001	(0.0006)	0.0025***	(0.0009)	0.0044***	(0.0014)
Foreign Ownership	-0.0047**	(0.0019)	-0.0086***	(0.0012)	-0.0083***	(0.0011)	-0.0077***	(0.0016)	-0.0088***	(0.0026)
Firm age	-0.0001***	(0.0000)	-0.0000***	(0.0000)	-0.0001***	(0.0000)	-0.0002***	(0.0000)	-0.0002***	(0.0000)
Factor conditions	0.0044***	(0.0015)	0.0020**	(0.0010)	0.0007	(0.0008)	-0.0004	(0.0011)	-0.0005	(0.0019)
Factor conditions^2	-0.0009*	(0.0005)	-0.0008**	(0.0003)	0.0001	(0.0003)	0.0008**	(0.0004)	0.0013*	(0.0007)
Population Growth	0.0068**	(0.0034)	0.0069***	(0.0022)	0.0040**	(0.0018)	0.0016	(0.0026)	-0.0034	(0.0046)
Sector diversity	-0.0412***	(0.0140)	-0.0141	(0.0105)	-0.0063	(0.0093)	0.0042	(0.0136)	0.0208	(0.0191)
Population Density	-0.0033***	(0.0011)	-0.0044***	(0.0007)	-0.0030***	(0.0006)	-0.0011	(0.0009)	0.0029*	(0.0015)
Quality of Government	0.0111***	(0.0041)	0.0042**	(0.0021)	0.0017	(0.0019)	0.0001	(0.0027)	0.0072*	(0.0040)
Constant	0.0829***	(0.0308)	-0.0167	(0.0221)	0.0246	(0.0197)	0.0661*	(0.0290)	0.0804**	(0.0405)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19024		19024		19024		19024		19024	
R squared	0.120		0.042		0.027		0.028		0.036	

Significance levels: * p<.10 ** p<.05 *** p<.01

[i] An alternative indicator besides employment is turnover growth that is commonly cited by Eurostat-OECD (2007). However, we prefer to use the employment definition, which is used by the majority of studies on HGFs.

[ii] Eurostat (2017) uses a more flexible definition of HGFs, namely annualised growth in employee numbers of more than 10% per year over a three-year period and at least 10 employees when this growth began.

[iii] Although the literature on contextual factors is wide-ranging, including cultural and other technological aspects, our analysis in this paper is constrained by the availability of data at the disaggregated regional level for our sample of 14 European countries. We acknowledge that further research is needed in this regard (see conclusion section for discussion).

[iv] For more information on the characteristics, accuracy and coherence of the ORBIS database, see Pinto Ribeiro et al. (2010).

[v] In line with the Eurostat-OECD guidelines (2007), we remove these firms to avoid micro enterprise growth. A subset of around 0.02% of firms was also excluded based on suspicious employment and assets values in addition to the standard cleaning undertaken already by Bureau van Djik. Results are fully robust to the whole dataset, as well as winsorized variables at the 1% and 5% levels.

[vi] Excluding micro firms.

[vii] In the dataset, there is slight overrepresentation of large firms for the UK and Germany. Results are fully robust when removing observations from these countries.

[viii] Results are robust to a specification based on turnover, and estimates are available upon request.

[ix] While NUTS2 reflect aggregate local authorities, they do not necessarily mirror city region geographies. This is notably the case of the UK in our sample. To address this potential issue, we have run our analysis removing observations from the UK. Results are fully robust and are available upon request.

[x] For both methods, robust standard errors are used in order to account for heteroscedasticity. Results are also robust to multilevel regression. These are available upon request.

[xi] Quantile regression for the 95th percentile, reflecting the 20% growth threshold suggested by Eurostat-OECD definition for HGFs in our sample, provides fully robust results to those reported in the paper for the 90th percentile.

[xii] Splitting the sample between services and manufacturing firms did not reveal significant differences in the reported results.

[xiii] We thank an anonymous reviewer for pointing this out.

[xiv] As a further test to check whether such differences were the result of a larger sample size for small firms, we also run our analysis using a random 50% sub-sample, but results were consistent with those reported in Table 4.