

What Holds Back SME Growth?: A Survey of Perceived Growth Barriers Among Top Managers*

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Abstract:

We test two hypotheses: 1) that the prevalence of firm growth barriers follow an inverse U-shaped relationship across firm size, i.e., we test for a ‘Penrose effect’ and; 2) that top managers in younger firms are more likely to face growth barriers compared to those of older firms. The analysis is based on a cross-sectional survey of ten categories of perceived growth barriers across top managers in 15,000 Swedish small- and medium-sized firms (SMEs) for year 2014. We find partial support of a Penrose effect, where firms with 6-36 employees are between approximately 15 and 20 percent more likely than smaller firms to face growth barriers. We also find partial support that younger firms are more likely than older ones to face growth barriers, although we find this latter difference to be small.

JEL codes: D22, D80, O43

Keywords: entrepreneurship; growth barrier; perception; firm growth; constraint

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* I gratefully acknowledge financial support from the Swedish Agency for Economic and Regional Growth. I am grateful for the comments from Fredrik W. Andersson, Sten Axelsson, Dan Johansson, Magnus Lodefalk, Andreas Poldahl, XX, YY, ZZ and participants at seminars at XX, and at Örebro University.

1 Introduction

Small business is widely recognized as an important source of innovation and economic growth (Audretsch and Keilbach 2004; Wennekers et al. 2005; Acs and Szerb 2007; Audretsch 2007; Acs and Sanders 2013). In recent decades, research on small business has gone from being a sparsely researched topic towards being a recognized field of both business and economics (Acs and Audretsch 2005; Landström 2010). Today, many researchers acknowledge that smaller firms offer particular opportunities and challenges which require their own brand of theory and empirical research.

The political debate has under this period undergone similar changes to those within the academic literature, where policy has gone from being sometimes unaccommodating and obstructive towards entrepreneurship to promoting new firm formation, entrepreneurship and firm growth (Audretsch and Thurik 2001; Stevenson and Lundström 2001; Gilbert et al. 2004; Henrekson and Stenkula 2010; McCann and Ortega Argiles 2016; Henrekson 2017). This increased benevolence among policy makers towards entrepreneurship does, however, only grant that conditions exist for entrepreneurial policy to take place. For these policies to also be efficient, policy makers need not only know *what* to support, but also *how*, *when* and *whom* to support. This puts emphasis on the role of economic evaluation to guide policy makers by expanding the current knowledge on the dynamics between institutions and firm growth. This means, in extension, that there is not only a need to for research on the effects of institutional change on entrepreneurial growth, but also to identify *current* institutional constraints to private entrepreneurship. By this, empirical research offer tools to systematically evaluate the effects of legislative change on firm growth, and moreover to evaluate the alternative cost of policy alternatives. As a consequence, it is imperative that research is undertaken not only to study the cause of past growth, but also to study the constraints that firms face in their day-to-day operations, i.e. firm growth barriers.

Within the academic literature on firm growth barriers, several recent studies have evaluated the outcome of specific changes in legislation with respect to firm growth (Carlsson 2002; Davidsson and Henrekson 2002; Harris 2002; Klapper et al. 2006; Henrekson et al. 2010; Garicano et al. 2013; Colombo et al. 2015; Kitching et al. 2015; Bornhäll et al. 2016; Decramer and Vanormelingen 2016; Figueroa-Armijos and Johnson 2016). In some cases, however, researchers and policy makers may also be interested in evaluating firm growth barriers with respect to *current* institutions. In such cases, it may be beneficial to adopt an exploratory approach to firm growth barriers. A common approach to this problem has, for example, to

conduct business surveys in an effort to identify constraining factors to firm growth, as perceived by firm top managers (e.g., ...).

A number of previous studies have utilized a perception-based approach based on such surveys in order to study firm growth barriers. However, most of these studies have been conducted in non-Western economies and often with respect to country-specific institutions. Moreover, within Western economies, research on perceived growth barriers has mainly been confined to Anglo-Saxon economies (e.g., Orser et al. 2000; Carter et al. 2009; Lee and Cowling 2013; Lee 2014; Lee and Drever 2014; Lee and Cowling 2015). Consequently, no study of perceived growth barriers has yet been conducted for institutions comparable to those of Scandinavia and continental Europe (Orser et al. 2000; Casper and Whitley 2004; Cernat 2004; Carter et al. 2009; Lee and Cowling 2013; Brown and Lee 2014; Lee 2014; Lee and Drever 2014; Lee and Cowling 2015). Moreover, previous research has largely focused on specific subgroups of firms, i.e., firms within specific regions and firm categories. Hence, few studies have yet to connect the perception of firm growth barriers to general economic theory.

To better understand the dynamics of firm growth barriers, it is therefore imperative that we further consider and explore the dynamics perceived firm growth barriers. We address these gaps in the literature by relating perceived firm growth barriers to the hypotheses of Jovanovic (1982) and Penrose (1959). These hypotheses are tested for a representative sample of approximately 15,000 Swedish SMEs, where firm growth barriers are measured in terms of perceived growth barriers as stated by firm top managers. The propensity for top managers to face growth barriers is then related to the size, age, industry and location of firms as well as the gender and birth region of top managers. Perceived growth barriers are studied across ten categories: Competition from other firms, demand on the firm's goods and services, firm profitability, access to credits and loans, access to external capital, access to appropriate infrastructure, access to appropriate labor, plant capacity, lack of time for planning and strategizing and whether they consider laws and regulations to be a growth barrier.

The purpose of this study is threefold. First, we utilize data from a Swedish business survey to describe the distribution and prevalence of perceived firm growth barriers among SMEs across firm size and age. Second, we utilize the same data to conduct an econometric analysis where we test whether younger firms are more likely than older ones to face growth barriers, as hypothesized by Jovanovic (1982). Third, we also test whether perceived firm growth barriers follow an inverse U-shaped relationship across firm size, as hypothesized by Penrose (1959).

We find that younger firms are more likely than older firms to face growth barriers relating to accessing credits, external capital and their current plant capacity, whereas we find partial support that perceived growth barriers follow an inverse U-shaped relationship across firm size.

We contribute to the literature in three ways: First, by conducting the, to our knowledge, third ever largest study of perceived firm growth barriers as well as the first ever large-scale study of perceived growth barriers of a Western, non-Anglo-Saxon economy. Second, we test the learning hypothesis of Jovanovic (1982) by studying the relationship between firm age and the perception of growth barriers. Third, we conduct the first ever study to test whether perceived firm growth barriers follow an inverse U-shaped relationship across firm, i.e., to test for the presence of a “Penrose effect”.

The rest of the paper is organized as follows. The next section presents our underlying theory and our hypotheses. Section 3 reviews the current literature on perceived growth barriers. Section 4 gives detail on our data and Section 5 on our empirical method. Section 6 contains descriptive statistics and Section 7 the results of our econometric analysis. Section 8 provides concluding remarks.

2 Theory

Most firms face constraints to growth at some stage during their lifecycle (Penrose 1959; Orser et al. 2000; Naldi and Davidsson 2014). These constraints may be both internal; such as a lack of market information or a lack of entrepreneurial and managerial skill, as well as external; such as competition and unfavorable institutions (Storey 1994; Davidsson et al. 2005). In this study, we will delimit ourselves to studying the internal factors which affect firm growth barriers, i.e., factors which are owing to the decisions, collaboration and abilities of actors within firms. We focus on two issues relating to internal firm growth barriers: organizational complexity and firm learning. We depart from the models of Penrose (1959) and Jovanovic (1982) and derive two testable hypotheses.

2.1 *Firm growth barriers and organizational complexity*

A long line of literature has hypothesized that firms face growth barriers during certain stages of their growth process. Penrose (1959) describes in her seminal work how the Schumpeterian innovation process depends on the functionality of the top management team within firms. More specifically, Penrose (1959) hypothesized that the prerequisite for firm growth is that the top management team is able to absorb and utilize knowledge efficiently. Moreover, Penrose hypothesized that during the early growth process of firms, the firm's managerial capacity is likely to be constrained due to increased organizational complexity; commonly referred to as the 'Penrose effect'. This means that during these growth transitions, the top management team is restricted by tending to administrative tasks, rather than managing and developing the firm. Moreover, a key assumption is that during this phase, firms are not large enough to support additional management in order to address their managerial shortage (Buckley and Casson 2007). Beyond given thresholds, however, firms are able to support and implement specialized managerial functions which, in turn, gives rise to increasing economic returns (Penrose 1959; Mueller 1972; Garnsey 1998; Kay 2005; Shelton 2005; Buckley and Casson 2007; Pitelis and Verbeke 2007).

This process has also been described in the parallel economic literature on economies of scale, complexity and agglomeration (e.g., Young 1928; Gibrat 1931; Stigler 1951, 1958; Lucas 1978; Parr 2002a, 2002b). However, in this strand of literature, the entrepreneur nor the top management team is not explicitly present in the process, meaning that it's not specified *who* makes the decision to grow and to organize the resources of firms. We therefore choose to primarily rely on the framework by Penrose as it captures the equivalent scaling properties of

firms with the addition of relating this to the top management team and the Schumpeterian entrepreneur.

Both strands of literature do, however, arrive at the same conclusion; firms will be (relatively) constrained in the earlier parts of their growth process, compared to when they are established, i.e., when they have reached sufficient scale.

Based on the notion of a Penrose effect as well as the presence of economies of scale, we hence expect that the prevalence of firm growth barriers should increase during the early stages of firm growth, whereas it should gradually decrease past certain firm size thresholds. In other words, we expect the prevalence of firm growth barriers to follow an inverse U-shaped relationship across firm size. We thereby yield the following hypothesis:

H₁: The prevalence of firm growth barriers follow an inverse U-shaped relationship across firm size.

2.2 *Firm growth barriers and learning*

In devising our model of firm growth barriers, we moreover divert from the standard economic assumptions of firm behavior, i.e., complete rationality and complete information. Instead, we view firms as a collection of actors who operate on a market with limited information on their competitors, institutions and consumers. In other words, we see the firm as a constellation of individuals who make rational decisions based on incomplete knowledge, i.e., bounded rationality (Simon 1955; March and Simon 1958; Stigler 1961; Mueller 1972; Nelson and Winter 1973, 1982; Simon 1991, 2000; Foss 2003). In this setting, both the firm and the market can be seen as an accumulated product of trial and error, where neither producer nor consumer has complete knowledge of future market outcomes (Eliasson 1991; Johansson 2010). This means that firms are not simply endowed with market knowledge, as sometimes assumed, but rather accumulate knowledge over time and make increasingly informed strategic decisions based on that knowledge. This means that we expect older firms to *ceteris paribus* have competitive advantages over younger firms as they are more experienced and, therefore have more extensive market knowledge. This process of iterative firm learning has been formalized by Jovanovic (1982) and further elaborated by Audretsch and Mahmood (1994), Audretsch et al. (2004) and Grillitsch and Rekers (2016). This implies that firms and markets will evolve based on past interactions and that the growth of firms will be alleviated by experience and age.

However, theory tells us also that a firm's competitive advantage of experience may also be counteracted over time. This is often attributed to path dependency, i.e., that older firms have more sunk costs than younger firms and they therefore have greater costs of adjusting to market changes, such as technological shifts or shifts in consumer demand (e.g., Penrose 1959; Mueller 1972; Simon 1991; Barnes et al. 2004; Naldi and Davidsson 2014). We therefore expect that firms yield positive, albeit declining benefits of aging in terms of that older firms are less likely than younger firms to face growth barriers. This latter proposition is in accordance with empirical findings (Evans 1987b, 1987a; Huergo and Jaumandreu 2004; Bjuggren et al. 2013; Barba Navaretti et al. 2014; Coad et al. 2016). Based on Jovanovic (1982) and on the notion of path dependency we hence propose the following hypothesis:

H₂: Younger firms are more likely to face growth barriers compared to older firms.

3 Previous literature

In the previous literature, we divide research on firm growth barriers into two wide categories: those which are based on *changes* in institutions with respect to firm growth, and those which are based on top manager's perceptions of *current* institutions with respect to firm growth. Since our study concerns perceived firm growth barriers within current institutions, we have chosen to delimit ourselves to present a survey of the latter strand of literature.²

Within the perception-based literature, we further delimit ourselves to studies which explicitly focus on top manager's perception of barriers to *growth*. There is, for example, a sizable literature concerning top managers' perceptions of innovation barriers, entrepreneurial aspiration and financial barriers which is not included here. We moreover delimit ourselves to published academic papers, i.e., we exclude policy reports, conference proceedings and the like.

Table 1 and Figure 1 summarize the previous empirical literature on perceived growth barriers. The included studies have been identified by use of search strings relating to the words

² A number of studies have studied changes in institutions and its effects on subsequent firm growth; see, for example Carlsson (2002), Davidsson and Henrekson (2002), Harris (2002), Klapper et al. (2006), Henrekson et al. (2010), Garicano et al. (2013), Kitching et al. (2015), Colombo et al. (2015), Bornhäll et al. (2016), Decramer and Vanormelingen (2016) and Figueroa-Armijos and Johnson (2016).

“growth”, “barrier”, “perception” and “constraints”.³ As we can see from Table 1, most studies on perceived growth barriers have been conducted using relatively broad approaches – such as studying the prevalence of perceived growth barriers in general and/or their relationship to a range of firm- or top management characteristics. Moreover, we can see that most studies have used a descriptive approach to analyze perceived growth barriers.

Another notable aspect of Table 1 and Figure 1 is the fact that most previous studies have been conducted in non-Western economies (Africa, Asia and Eastern Europe); approximately 70 percent. Moreover, as we can see from Table 1, these studies have typically been conducted with relatively small samples of firms within each economy; 145, 200 and 332 observations on the median, respectively.

From Table 1, we can also see that three multinational studies have been conducted. These have included a number of Western European countries, including France, Germany, Spain, Portugal and Sweden (i.e., Beck et al. 2005; Ayyagari et al. 2008). However, these studies focus on presenting cross-country evidence on growth barriers from a large number of nations, whereas they observe a limited number of firms from each economy. For these Western European countries, most firm categories and growth barriers are therefore yet to be surveyed.⁴ Some larger studies of perceived growth barriers have, however, been conducted in Western economies. These studies are, to the best of our knowledge, delimited exclusively to Canada and the UK.⁵

The large-scale studies within Canada and the UK have been concerned with general top management characteristics (Orser et al. 2000), employment legislation (Carter et al. 2009), firm demographics (Lee and Cowling 2013; Lee and Drever 2014; Lee and Cowling 2015) and high growth firms (Lee 2014). Hence, no researcher(s) have yet to relate perceived firm growth barriers to general economic relationships among Western economies.

We address this gap in the current literature by testing two hypotheses relating to firm characteristics and growth barriers. First, we test for the presence of a Penrose effect by testing whether the prevalence of perceived growth barriers follow an inverse U-shaped relationship

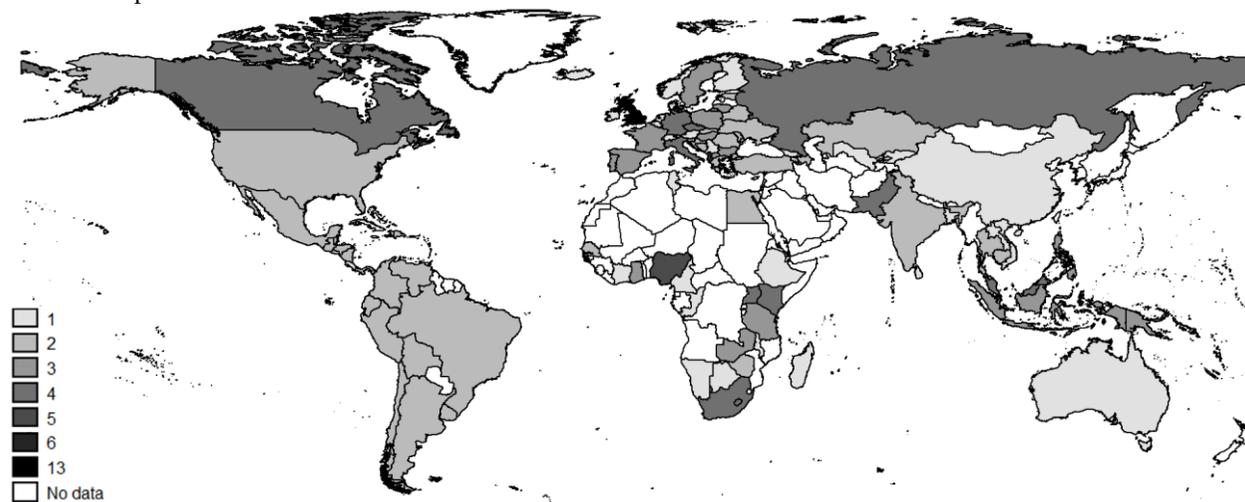
³ Papers have primarily been identified using Google Scholar©. A similar albeit less exhaustive literature review on perceived growth barriers was conducted by Doern (2009) for studies up until 2007. A detailed list of the surveyed literature can be found in Appendix A.

⁴ Beck et al. (2005) and Ayyagari et al. (2008) include, for example, 68 and 73 firms from Sweden, respectively.

⁵ We identify one large-scale study from a single economy outside Canada and the UK; namely Coad and Tamvada (2012) who studied perceived growth barriers among approximately 85,000 firms in India.

across firm size. Next, we test the learning hypothesis of Jovanovic (1982) by testing whether top managers of younger firms are more likely to face growth barriers compared to those in older ones.

Figure 1. Geographical distribution of previous studies.



Notes: Some multinational studies have included a large number of economies, albeit with limited data on each economy. A detailed list of the surveyed literature can be found in Appendix A.

Table 1. Summary of the previous literature on perceived firm growth barriers.

Regions	General characteristics				Methodological approach				Research focus			
	Number of studies	Percentage of studies	Average sample size	Median sample size	Probabilistic	Descriptive	Other quantitative	Qualitative	Firm characteristics	Top management characteristics	General growth barriers	Institutions
Africa	16	29	735	145	4	6	3	3	3	2	8	3
Australia	1	2	20	20	0	0	0	1	0	0	1	0
Asia	8	14	10,851	200	1	3	3	1	2	0	6	0
Eastern Europe	15	27	1,789	332	2	6	6	1	3	1	6	5
Western Europe	11	20	3,512	2,028	4	2	2	3	5	1	2	3
North America	2	4	611	612	1	0	1	0	1	1	0	0
South America	0	0	0	0	1	0	2	0	1	0	1	1
Multiple regions	3	5	25,778	4,255	4	0	3	0	3	2	8	3
Total	56	100	4,333	230	13	17	17	9	15	5	24	12

Notes: The number of studies per region in this table deviate somewhat from the numbers in Figure 1; this comes as these regions also appear in multiregional studies, which are presented separately. Papers have primarily been identified using Google Scholar®. A detailed list of the surveyed literature can be found in Appendix A.

4 Data

We utilize data from the Swedish survey “The Situation and Conditions of Enterprises” (*Företagens villkor och verklighet*). The data constitutes a business survey which is conducted every third year by Statistics Sweden on behalf of the Swedish Agency for Economic and Regional Growth. The survey targets top managers of small- and medium-sized firms (SMEs) and contains questions relating to business activities, internationalization, participation in government procurement processes and perceived growth barriers. For the setting of this study, we will delimit ourselves to questions regarding perceived growth barriers. SMEs are in this setting defined as firms with 0-249 employees with an annual turnover exceeding approximately €20,000 (200,000 Swedish Crowns).⁶

The survey consists of a questionnaire which is sent by mail to a representative, stratified random sample of Swedish SMEs, where the surveyed population is delimited to private and domiciled sole proprietorships, partnerships and limited liability firms (excluding the financial sector).⁷ The population is stratified by both firm and top manager characteristics – i.e., firm size, industry and geographical location (county) as well as the gender of the top manager.

We utilize data from the 5th wave of the survey which was collected during late 2013 to early 2014. Previous waves have been undertaken for the years 2002, 2005, 2008 and 2011. The current wave was sent out to approximately 31,000 firms, out of which approximately half made it into the final sample; a total of 15,580 firms. This is equivalent to a response rate of approximately 51 percent, which is higher than most comparable surveys (Cycyota and Harrison 2006; Baruch and Holtom 2008). The survey data has, moreover, been combined with administrative data from Statistics Sweden concerning both top manager and firm characteristics for the end of year 2013.

Top managers are asked to state their perception on whether a set of ten factors constitute a barrier to growth: Competition from other firms, demand on the firm’s goods and services, firm profitability, access to credits and loans, access to external capital, access to appropriate infrastructure, access to appropriate labor, plant capacity, lack of time for planning and

⁶ i.e., in accordance with the OECD (2005) definition.

⁷ The financial sector is omitted due to the nature of Swedish administrative data on financial results for businesses, which does not encompass these firms. By omitting these firms, this allows the survey to have complete data for all observations. The surveyed population constitutes more than 90 percent of all Swedish firms.

strategizing as well as laws and regulations. Lastly, top managers are also asked to state the intensity of each barrier on a three-point Likert scale ranging from zero to two. A rating of 0 corresponds to “No barrier to growth”, 1 “A moderate barrier to growth” and 2 to “A significant barrier to growth”. Table 2 presents the questions posed to top managers and their corresponding scales.

Table 2. Included questions posed to top managers.

Question: To what extent do you perceive the following factors to be barriers to firm growth?	
Access to appropriate labor	(0) Not a barrier (1) A moderate barrier (2) A significant barrier
Access to credits	(0) Not a barrier (1) A moderate barrier (2) A significant barrier
Access to external capital	(0) Not a barrier (1) A moderate barrier (2) A significant barrier
Access to appropriate infrastructure	(0) Not a barrier (1) A moderate barrier (2) A significant barrier
Plant capacity	(0) Not a barrier (1) A moderate barrier (2) A significant barrier
Lack of time for planning and strategizing	(0) Not a barrier (1) A moderate barrier (2) A significant barrier
Laws and regulations	(0) Not a barrier (1) A moderate barrier (2) A significant barrier

5 Empirical strategy

In order to test our hypotheses, we need to define our empirical strategy. In this section we first present the econometric model used to test our hypotheses. Next, we present descriptive statistics and definitions of the included variables.

5.1 Econometric model

We utilize, in likeness with a number of previous studies, a probabilistic model to test the likelihood that a top manager perceives a certain factor to be a barrier to growth, given firm and top manager characteristics. We are mainly interested in whether top managers face *significant* growth barriers or not. Therefore, we choose to treat our outcome variables, perceived growth barriers, as binary, where top managers perceive a given factor to be either a significant growth barrier, or not. Formally, we utilize a probit model to test the likelihood that the top manager of firm i perceives factor j as a significant growth barrier in the following model:

$$\begin{aligned}
\text{Growth barrier}_{ij} = & \alpha + \theta \text{Size}_i + \vartheta \text{Firm age}_i + D_1 \text{Family}_i + D_2 \text{Female}_i + \\
& \rho \text{Region of birth}_i + D_3 \text{Enterprise}_i + \psi \text{Franchise}_i + \eta \text{County}_i + \mu \text{Industry}_i + \\
& D_4 \text{Growth ambition}_i + e_i
\end{aligned} \tag{1}$$

5.2 Dependent variables

The dependent variables of our model comprise of the ten binary variables; one for each category of perceived growth barriers. These are: Competition from other firms (Competition), demand on the firm's goods and services (Demand), firm profitability (Profit), access to credits and loans (Credits), access to external capital (External capital), access to appropriate infrastructure (Infrastructure), access to appropriate labor (Labor), plant capacity (Plant capacity), lack of time for planning and strategizing (Time) and laws and regulations (Regulations). Each of the above variables assume the value 1 if a top manager perceives that particular factor to be a significant growth barrier and 0 otherwise.

5.3 Control variables

Once we have identified all parts of the survey which contain questions on firm growth barriers, we then wish to identify our model in terms of control variables, i.e., firm and top manager characteristics. This process does, however, require some methodological elaboration. This comes as our first hypothesis involves testing a non-linear relationship between firm size and firm growth barriers, whereas it is not possible to do so directly from our data. This comes as the data is stratified by firm size which, in extension, means that we have limited number of observations for larger firms. In practice, this means that we must treat firm size as a categorical variable rather than a continuous one in order to yield meaningful predictions for all firms.

Categorization of firm sizes does, however, present an empirical challenge as the selection criteria used is also likely to influence the outcome of our analysis. Therefore, in an effort to value neutrally categorize firm sizes, we have opted for categorizing firm sizes into intervals based on each interval's model fit. This method of identifying firm size intervals does however require that all other relevant variables in the model are identified. Therefore, in this section, we present our independent variables, in excess to firm size, and thereafter present our method for identifying firm size categories.

5.3.1 Firm-level control variables

The first factor which we wish to control for is that which is linked to our first hypothesis – firm age (Firm age). Firm age refers to self-reported firm age, as stated by top managers,

which is controlled for using four categorical variables. Firm age is categorized due to exhibits a skewed and heterogeneous relationship to perceived growth barriers. Therefore, in order to extract meaningful information on firm age dynamics, we find it preferable to use a set of dummy variables over a joint coefficient, as also discussed by Streiner (2002).⁸ We follow the principle of Morck et al. (1988) and Loderer and Waelchli (2010) and construct a set of categorical variables by the dividing firm age into quartiles. This yields four age groups: 0-6 years (0-6 years old), 7-13 years (7-13 years old), 14-24 years (14-24 years old) and more than 24 years (> 24 years old). We find that this categorization is similar to that of Loderer and Waelchli (2010), as well as the categorization within theoretically motivated models, e.g., Steffens et al. (2009), Coad et al. (2013), and Lee (2014). Therefore, we choose to proceed with this categorization.

Next, it is likely that regional conditions affect the nature and conditions of business (Krugman 1991; Ciccone and Hall 1996; Combes 2000). Therefore, we control for the geographical location of each firm in terms of counties; a total of 21 regions (County).⁹ Moreover, business conditions are likely to differ across industries (e.g. Klomp et al. 1998; Hoogstra and Dijk 2004). Therefore, we also control for the industry of each firm (Industry) on the three-digit level in accordance with the Statistical Classification of Economic Activities in the European Community (NACE, rev. 2). Next, previous literature tells us that firm behavior and perceptions of growth barriers are likely to differ between family managed and non-family managed firms (Hiebl 2012; Lee and Cowling 2013; Lee and Cowling 2015; Kay and Schlömer-Laufen 2016; Andersson et al. 2017a, 2017b; Karlsson 2017; Schäfer et al. 2017). Therefore, we include a dummy variable indicating whether a firm is family managed or not (Family firm).¹⁰ Moreover, firm conditions are likely to differ depending on whether a firm is independent or part of a larger organization (Delmar et al. 2003; Buckley and Casson 2007; Bjuggren et al. 2013; Mahmood et al. 2016). Therefore, we control for whether a firm is part of

⁸ In this case, it is also not possible to use a regression fit principle, as described for firm size, as this requires that all other variables are identified in the model.

⁹ For firms operating in multiple counties, this refers to the county where the largest workplace is situated (number of employees and sales).

¹⁰ Family management is represented by whether the respondent of the survey has stated that (s)he manages the firm alone or with his/her spouse. In this sense, the definition comprises an approximation of the European Commission (2009) definition of family firms.

an enterprise group (Enterprise group) or a franchise (Franchise). Being part of an enterprise group is controlled for using a dummy variable, assuming the value “1” if a firm is part of an enterprise group and “0” otherwise. Franchise management is controlled for in two respects; 1) whether firms are part of a franchise and, 2) whether they are part of a foreign or domestically owned franchise.

5.3.2 Top manager control variables

Previous studies show that the gender of top managers and/or firm owners is likely to affect which factors they perceive as restraining to growth (Pearson et al. 1993; Orser and Hogarth-Scott 2002; Kwong et al. 2012; Adkins and Samaras 2013). Therefore, at the top manager level, we control for the sex of the top manager (Female).

Moreover, it is recognized in the empirical literature that ethnic minorities are more likely to face growth barriers, in particular with respect to acquiring finance (Christopher 1998; Fraser 2009; Lee and Drever 2014; Aldén and Hammarstedt 2016; Clark et al. 2017; Lee and Black 2017). This has been attributed to adverse selection issues or, alternatively, to discrimination. Therefore, we control for the birth region for each top manager (Region of birth). Birth region is controlled for at three levels; 1) whether the top manager is born in Sweden; 2) outside Sweden but within Europe or; 3) born outside Sweden and outside of Europe. Lastly, a key determinant for top managers to face growth barriers is whether they have growth ambitions. Previous literature tells us that not only are growth ambitions and growth barriers positively related, but they are also likely to differ across firm size, where smaller firms are generally less growth oriented (Davidsson 1989; Greenbank 2001; Gray 2002; Walker and Brown 2004; Cassar 2007; Hessels et al. 2008; Lee 2014; Gherhes et al. 2016). Therefore, we lastly control for whether a top manager has growth ambitions or not (Growth ambition).

5.3.3 Identifying firm-size categories

Having identified all our other independent variables, the task of categorizing firm sizes reduces to an econometric problem of identifying the nature of perceived growth barriers across firm size. To approach this task, we have utilized the abovementioned firm- and top-manager characteristics along with a rolling set of dummy variables that assumes the value “1” for all consecutive firm size intervals between 0 and 249. These are then regressed against all categories of perceived growth barriers to estimate their fit. This means that we perform 250 regressions per growth barrier while controlling for the abovementioned firm and top manager characteristics. From that, we then select the intervals which best describe the variation of each

growth barrier in terms of adjusted R^2 . Thereafter, we add the estimated intervals into their corresponding models and repeat the process until we yield intervals that cover all firm sizes.

The adjusted R^2 measure is, however, sensitive to variance. In our case, this imposes a problem as we have relatively few observations for large firms. Due to this, estimates for these firms exhibit relatively high variance. This issue is not a specific problem stemming from our particular dataset, but it rather occurs naturally as our sample has been drawn to represent the true distribution of firm sizes across Swedish SMEs.

This means that that if we were to select firm intervals based on adjusted R^2 alone, we would risk ending up with overly wide categories and thereby neglect important dynamics among micro- and small-sized firms, i.e., the vast majority of our population. To remedy this, we therefore weight all intervals by their estimated Kernel density, thereby giving greater weight to groups with greater frequency and thus counteracting the skewing effects of larger firms. Moreover, we utilize another helpful property of the Kernel estimator, namely that it identifies potentially affluent categories. We utilize this to restrict the model in terms of that it cannot fit two entire categories into the same Kernel bandwidth. By this, we reduce the risk of introducing small, affluent groups. Our approach yields a total of 50 firm size categories per growth barrier based on 122,500 regressions.

Once we have identified the best model fit for each type of growth barrier, we then optimize the fit of our estimates in a joint categorical variable across all identified size categories. By this, we yield a single firm size categorization which on fits our ten growth barriers best.

Finally, in order to make our estimates more presentable, we consolidate these 50 firm size categories by joining firm size intervals and, again, choosing groups based on their model fit. This process is repeated until all firm sizes are once again accounted for. This results in a final set of 11 size categories: 0-5 employees (0-5), 6-7 employees (6-7), 8-9 employees (8-9), 10-12 employees (10-12), 13-15 employees (13-15), 16-27 employees (16-27), 28-36 employees (28-36), 37-66 employees (37-66), 67-81 employees (67-81), 82-97 employees (82-97) and 98-249 employees (98-249).

In order to ensure the performance of this method, the fit of the identified categories is compared to the fit of using a random and symmetric categorization of firm sizes, as well as the standard OECD categorization of SME sizes (0-9, 10-49 and 50-249 employees). Our analysis

shows that the chosen specification outperforms all of the above alternatives in terms of econometric efficiency.¹¹

5.4 Descriptive statistics

Table 3 presents descriptive statistics and definitions for the included variables. As we can see from Table 3, the typical (median) top manager is a male who was born in Sweden. Moreover, we can also see that the typical firm is an independent family firm that was established 13 years ago and has five employees. Next, we can see that the typical (median) top manager considers competition from other firms, insufficient demand for the firm's goods and services, lack of appropriate labor, firm profitability, laws and regulation and lack of time for planning and strategizing to be a moderate barrier to growth. Finally, we can see that the median top manager does not perceive access to credits, external capital and plant capacity to be a growth barrier.

¹¹ The results of this analysis can be sent by the author upon request.

Table 3. Descriptive statistics of included variables (mean, median, min max, standard deviation)

Variable	Definition	Mean	Median	Min	Max	SD
Competition	Competition as a growth barrier (0-2)	1.1	1	0	2	0.7
County	Geographical location of firm, county	-	-	-	-	-
Credits	Access to credit as a growth barrier (0-2)	0.6	0	0	2	0.7
Demand	Market demand as a growth barrier (0-2)	0.7	1	0	2	0.7
Enterprise group	Indicates whether or not the firm is part of an enterprise group (1/0)	0.2	0	0	1	0.4
Region of birth	Indicates the birth region of the top manager ("0" Swedish, "1" European, "2" Non-European)	0.1	0	0	2	0.4
External capital	Access to external capital as a growth barrier (0-2)	0.4	0	0	2	0.7
Family firm	Indicates whether or not the firm is family managed (1/0)	0.6	1	0	1	0.5
Franchise	Indicates whether the firm is part of a franchise ("1" Foreign franchise, "2" Domestic franchise, "3" Not part of a franchise)	2.8	3	1	3	0.6
Firm age	Firm age, number of years ^a	18.6	13	0	117	18.7
Female	Gender of top manager ("1" Female, "0" Male)	0.4	0	0	1	0.5
Industry	Firm industry, 3-digit NACE rev. 2	-	-	-	-	-
Labor	Access to appropriate labor as a growth barrier (0-2)	0.9	1	0	2	0.8
Plant capacity	Capacity of plants and equipment as a growth barrier (0-2)	0.6	0	0	2	0.7
Profit	Insufficient profit constitutes as a growth barrier (0-2)	0.9	1	0	2	0.7
Regulations	Laws and regulations as a growth barrier (0-2)	0.9	1	0	2	0.8
Size	Firm size, number of employees ^b	14.2	5	0	248	26.9
Time	Lack of time for strategizing as a growth barrier (0-2)	0.9	1	0	2	0.7

Notes: All values refer to the year of observation, 2013.

^a Firm age is measured as self-reported firm age, as stated by top managers.

^b This number is collected from total population registers at Statistics Sweden. A person is considered employed within a firm if (s)he has received income equivalent to at least 32 hours of work during the month of November.

6 Econometric results

Having defined our theoretical and empirical setting, we are now ready to test our hypotheses. In this section, we present the results of our econometric analysis. Table 6 presents the results of our analysis on the likelihood that a top manager perceives a certain factor to be a “significant growth barrier”. As our study concerns size and age dynamics with respect to firm growth barriers, we contend with presenting only estimates for firm size and firm age. The full regression table can be found in Appendix B.

Looking at the results in Table 6, we can see that top managers of firms with 6-249 employees are all more likely than firms with less than six employees to perceive competition as a significant growth barrier. We can also see that these estimates follow an upward sloping trend, suggesting that firms are increasingly likely to face issues relating to competition as they grow. This result could reflect limitations of local markets, where growing firms are likely required to expand into markets which are further away from their origin. Such expansions are, however, known to put pressure on firms in terms of competitiveness, as these new markets are likely to contain incumbent firms with previously established local knowledge and local networks (ref; ref). This is known to hold especially true for firms which expand abroad, where not only transaction costs are significant, but also transportation costs (ref; ref). When we analyze a supplementary question on the location of the primary market of firms across firm size, we find support for this notion, where firms with 82-249 employees are more likely than others to operate on foreign markets, as well as to face significant competition through prices.

Next, we can see that firms with 37-66 and 82-249 employees are more likely to face growth barriers relating to accessing credit compared to micro firms (0-5 employees), between approximately 5 and 11 percent. This seems, at first glance, to be a perplexing result, given that larger firms should, *ceteris paribus*, be *less* constrained than smaller ones in obtaining credit as they should have greater factor endowments to use as collateral, a history of previous performance, and so on. In order to investigate the cause of this, we analyze related questions on whether firms have applied for bank credit and, if so, whether these applications have been granted. Our analysis shows that firms with 37-66 and 82-249 are all more likely than smaller ones to both apply for and to receive bank credit, meaning that it is unlikely that these firms are inhibited by the availability of bank credit *per se*. Rather, it is likely that these firms are instead constrained by other issues relating to credit, such as obtaining it at desirable rates or with desirable maturity.

This could also tie back to our previous results, i.e., that larger firms experience fiercer competition through prices, as this would also imply that these firms are more likely to be sensitive to the costs and maturity of credit due to smaller profit margins.

From Table 6, we can also see that small firms with 6-66 employees are the most likely to face growth constraints relating to insufficient consumer demand, compared to firms with less than six employees. This result is likely due to a composition of two factors: 1) differences in growth ambitions and; 2) economies of scale. First, micro firms are known to typically be less growth oriented than larger firms businesses (Greenbank 2001; Gray 2002; Walker and Brown 2004; Cassar 2007; Hessels et al. 2008; Gherhes et al. 2016). This suggests that firms with less than six employees are seeking out new consumers to a lesser extent than firms with at least six employees, meaning that they are also less likely to experience issues relating to the latter. Secondly, past a certain point of firm size, in our case 66 employees, these differences do, however, diminish and firms of these sizes are likely to reap economies of scale as they have reached sufficient mass to establish specialized production and specialized managerial functions (e.g., Stigler 1958; Penrose 1959).

Next, we can see that firms with 28-36 employees are the most likely to face growth barriers relating to accessing external capital. When examining in-depth questions on whether firms have applied for external capital, we find that firms with 28-36 employees are less likely than smaller firms to do so, whereas they are more likely to receive it. We do, like with the case of bank credit, interpret this as that firms are not constrained in obtaining external capital *per se*, but rather in obtain it at desirable conditions.

We also find that firms with 28-36 employees are the most likely to face issues relating to infrastructure. This difference is however small – both in relation to other estimates as well as qualitatively in itself; approximately four percentage points. Rather, and perhaps with little surprise, we find that the main factor to explain whether firms face growth barriers relating to infrastructure is their geographical location, where firms located in the north of Sweden are the more likely to experience a lack of accessibility compared to those in the middle or south. This is likely due to that the north of Sweden involves several particularly large and relatively sparsely populated regions, meaning that accessibility is often relatively limited in these areas (ref; ref).

Next, as we can see from Table 6 that these firms are also the most likely to face growth barriers relating to accessing appropriate labor; approximately 16 percent. A supplementary

analysis of in-depth questions relating to accessing labor suggests that these issues are primarily related to finding employees with suitable education, experience and competence.

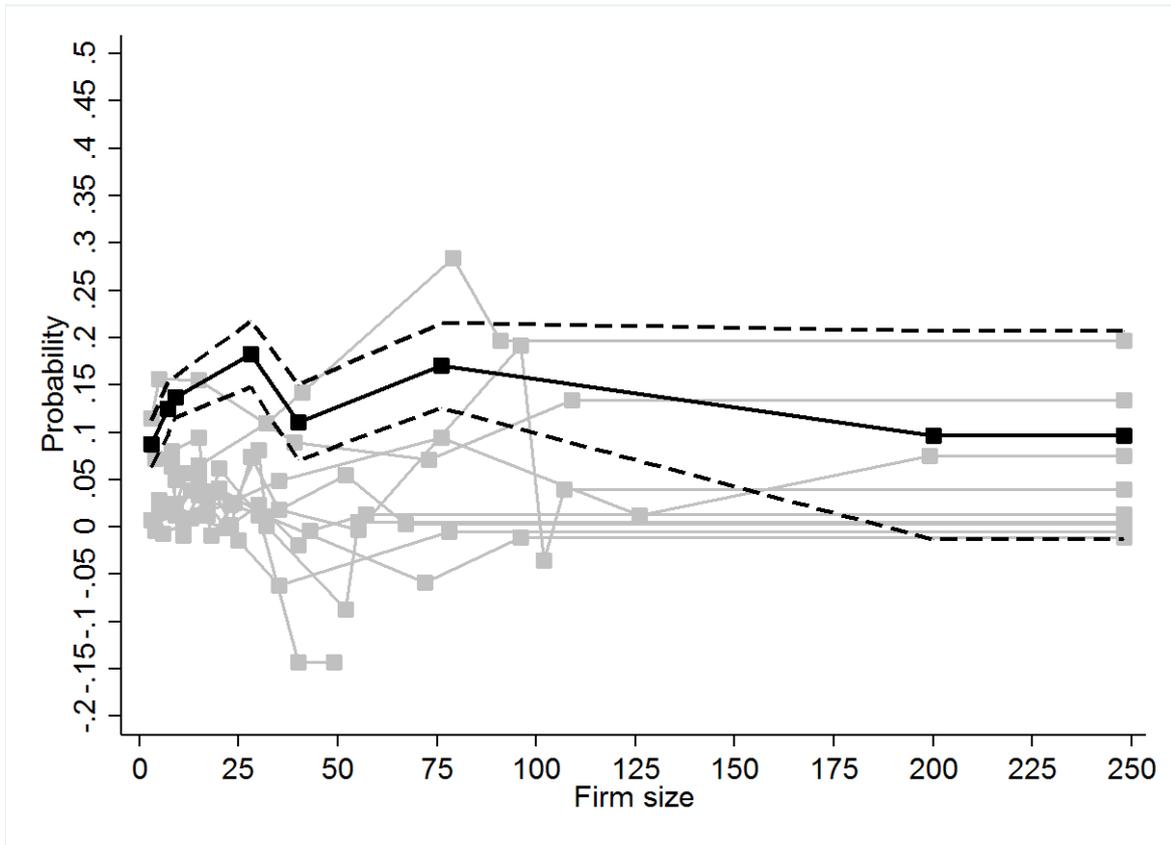
Moreover, we can see that firms with 13-15 employees are the most likely to face growth barriers relating to firm profitability, approximately 5 percent more than firms with less than six employees. This could be due to that firms within these sizes are, to a greater extent than others, undergoing a phase of expansion where they are moving from one efficient scale to another. We can also see that firms with 8-9 employees are the most likely to face growth barriers relating to insufficient time for planning and strategizing, as well as to current laws and regulations.

To recap our findings so far, the results of Table 6 regarding firm size seem to point in favor of a Penrose effect, where firms with 6-36 employees is the most common group to face growth barriers. Meanwhile, firms with 0-5 employees are found to be less likely to face growth barriers, whereas we find no significant differences for firms with 37-249 employees.

In order to firmly cement our results, we also undertake a supplementary graphical analysis. This approach allows us to impose different categorizations of firm size across different growth barriers, as opposed to the single categorization used in Table 6. Figure 2 illustrates fitted models for each category of perceived growth barriers along with a fitted estimate for the likelihood for firms to experience at least *one* type of growth barrier, indicated in bold. As we can see from Figure 2, we do again find partial support for a Penrose effect, where firms with 6-36 employees are the most likely to face growth barriers compared to micro firms with 0-2 employees. We can moreover see that the greatest difference in perceived growth barriers takes place as firms are within the transition of being a micro firm towards being a small-sized firm (0-2 employees versus 6-25 employees), where the probability to face growth barriers increases with between 15 and 20 percent. We can also see that past 36 employees, these differences diminish. This is interpreted as being due to scaling benefits, where firms with at least 37 employees are less likely to face growth barriers in their day-to-day activities.

Based on our findings in Table 6, we are hence able to partially confirm our first hypothesis in that the prevalence of firm growth barriers follow an inverse U-shaped relationship across firm size. These findings are also consistent with those of related studies (Mueller et al. 2012; Gherhes et al. 2016).

Figure 2. Probability for top managers to face at least one significant growth barriers, across firm size.



Notes: Marginal effect estimates, SMEs (0-249 employees). Estimates are adjusted for age, family ownership, franchise management, enterprise groups, industries and regions of firms as well as the gender and migration status of top managers. Reference group: Micro-sized firms (0-2 employees). Firm sizes have been categorized based on the model fit of firm size intervals (adjusted R²). Point estimates and 95% confidence intervals.

Returning to Table 6 and our second hypothesis, we can see that managers of older firms (≥ 14 years old) are less likely than top managers of younger firms to face growth barriers relating to accessing credits, external capital and current plant capacity. By this, we can also partially confirm our second hypothesis in that younger firms are more likely to face growth barriers compared to older firms. However, as we can also see from Table 6, top managers of older firms are also *more* likely than those of younger firms to perceive access to appropriate labor and infrastructure as a significant growth barriers, as well as the availability of time to plan and strategize. Hence, we find conflicting results for firm growth barriers across firm age.

These mixed results regarding are likely due to the nature of different growth barriers, where difficulties related to accessing credits and external capital, finding suitable commercial property and finding time to plan and strategize are likely to be more easily overcome by experienced and established firms, compared to inexperienced ones. Meanwhile, it is likely that older firms have more sunk costs connected to older technology and greater costs to adjust to

changes in technical standards (e.g., Penrose 1959; Mueller 1972; Simon 1991; Barnes et al. 2004; Naldi and Davidsson 2014).

In summary, we are hence able to partially confirm our second hypothesis in that younger firms are more likely to face growth barriers compared to older firms.

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Table 6. Results of regression analysis, probit estimation. Probability for top managers to face significant growth barriers

Variables	Growth barriers									
	Competition	Credits	Demand	External capital	Infrastructure	Labor	Plant capacity	Profit	Time Ψ	Regulations
6-7	0.0348** (0.0146)	-0.0139 (0.00992)	0.0305** (0.0130)	0.00643 (0.0108)	0.00812 (0.00964)	0.120** (0.0148)	-0.00416 (0.00816)	0.0228** (0.0108)	0.0664*** (0.0140)	0.0211 (0.0139)
8-9	0.0503*** (0.0173)	0.0286** (0.0133)	0.0671*** (0.0161)	0.0264** (0.0134)	0.0117 (0.0116)	0.124*** (0.0175)	0.0163 (0.0106)	0.0117 (0.0123)	0.0839*** (0.0168)	0.0409** (0.0168)
10-12	0.0646*** (0.0157)	0.0156 (0.0115)	0.0129 (0.0134)	0.00983 (0.0114)	-0.00278 (0.00968)	0.126*** (0.0156)	0.00592 (0.00906)	0.0164 (0.0111)	0.0586*** (0.0146)	0.0280* (0.0148)
13-15	0.0866*** (0.0195)	0.0254* (0.0146)	0.0482*** (0.0175)	0.00307 (0.0138)	-0.00646 (0.0117)	0.112*** (0.0191)	0.0126 (0.0114)	0.0496*** (0.0151)	0.0802*** (0.0186)	0.0340* (0.0182)
16-27	0.0771*** (0.0148)	0.0152 (0.0108)	0.0367*** (0.0131)	0.0249** (0.0111)	0.00322 (0.00937)	0.103*** (0.0144)	0.00104 (0.00828)	0.0125 (0.0105)	0.0465*** (0.0137)	0.0203 (0.0138)
28-36	0.0878*** (0.0235)	0.0197 (0.0173)	0.0576*** (0.0214)	0.0415** (0.0184)	0.0350** (0.0167)	0.163*** (0.0237)	0.00984 (0.0137)	0.0417** (0.0180)	0.0677*** (0.0221)	0.0250 (0.0219)
37-66 ϕ	0.165*** (0.0216)	0.0587*** (0.0169)	0.0412** (0.0185)	0.00687 (0.0148)	-0.0135 (0.0120)	0.0608*** (0.0193)	0.00572 (0.0121)	-0.00204 (0.0142)	-0.0795*** (0.0142)	-0.00201 (0.0187)
67-81	0.135*** (0.0374)	0.0161 (0.0257)	-0.00489 (0.0293)	-0.0233 (0.0227)	-0.0368** (0.0173)	0.0579* (0.0339)	-0.0123 (0.0192)	-0.0166 (0.0238)	Ψ Ψ	-0.00169 (0.0328)
82-97	0.217*** (0.0475)	0.117*** (0.0405)	0.0181 (0.0386)	-0.0767*** (0.0200)	-0.0252 (0.0240)	0.0332 (0.0404)	0.000994 (0.0262)	-0.00539 (0.0318)	Ψ Ψ	0.0443 (0.0428)
98-249	0.218*** (0.0317)	0.0547** (0.0237)	0.0218 (0.0254)	-0.0185 (0.0189)	-0.0154 (0.0166)	0.0799*** (0.0285)	0.0170 (0.0186)	0.0358 (0.0233)	Ψ Ψ	0.00663 (0.0273)
7-13 years old	-0.0200* (0.0105)	-0.0067 (0.00834)	0.00533 (0.00779)	-0.0057 (0.00703)	0.0123** (0.00587)	0.0400*** (0.0102)	0.00229 (0.00802)	0.00479 (0.00954)	0.0167* (0.00993)	-0.0034 (0.00975)
14-24 years old	0.00957 (0.0107)	-0.0240*** (0.00812)	0.012 (0.00787)	-0.0076 (0.00704)	0.0199*** (0.00606)	0.0437*** (0.0102)	-0.0178** (0.00766)	0.00817 (0.00955)	0.0302*** (0.0100)	-0.0027 (0.00980)
≥ 25 years old	0.00778 (0.0112)	-0.0390*** (0.00816)	0.00753 (0.00820)	-0.0221*** (0.00707)	0.0254*** (0.00648)	0.0288*** (0.0107)	-0.0200** (0.00796)	-0.0114 (0.00975)	0.0248** (0.0105)	-0.0177* (0.0102)
Observations	14,273	14,177	14,205	14,138	14,013	14,223	13,799	14,037	13,611	14,251
Pseudo R ²	0.0912	0.0422	0.0544	0.0608	0.0487	0.0881	0.0876	0.0837	0.0443	0.0585
Log likelihood	-8,104.2	-5,067.1	-6,758.2	-5,120.1	-4,039.1	-7,641.9	-3,305.6	-4,789.5	-6,652.3	-7,488.6

Notes: Marginal effects estimates on the probability that top managers perceive a factor to be a significant growth barrier. All values concern year 2013. For brevity, only estimates relating to firm size and age are presented here. Our full regression table can be found in Appendix B. Size refers to the number of employees. Firm age refers to the self-reported firm age as stated by top managers. All regressions are controlled for two polynomials of firm age. For brevity, only one estimate of age (average) is included here. Reference group: Non-

family firms with 0-5 employees that are part of a domestic franchise but not an enterprise group and top managers which are is born in Sweden and whose highest attained level of education is secondary school.

[‡] Medium-sized firms (50-249 employees) are not asked whether they perceive a lack of time for strategizing to be a growth barrier.

[♠] In the case when top managers are asked whether they perceive a lack of time for strategizing to be a growth barrier, this group constitutes firms with 37-49 employees, due to a cutoff at 49 employees for this survey question

7 Concluding remarks

The findings of this study suggest that most firms are likely to encounter barriers to growth during some part of their lifecycle. More specifically, our analysis shows that perceived growth barriers are not only related to the age of firms, but also to their size. We moreover find that firms face different kinds of growth barriers at different sizes. This latter result shines light on a heterogeneity of firm growth barriers across firm sizes which may not only have academic relevance, but may also be relevant for economic policy, i.e., that policy makers need not only consider *which* firms to support, but also what type of support is appropriate.

We contribute to the current literature in three ways. First, we conduct the first ever study to test whether perceived firm growth barriers follow an inverse U-shaped relationship across firm size, i.e., to test for the presence of a “Penrose effect”. Second, we conduct, to the best of our knowledge, the third ever largest study on perceived firm growth barriers. Third and lastly, we contribute to the literature by conducting the first ever study of perceived growth barriers in Western Europe outside the UK.

Our empirical findings show that top managers in firms with 6-36 employees are the most likely group to experience growth barriers, whereas top managers in firms with 0-5 employees are found to be the least likely to experience the latter. Meanwhile, we find no general relationship that would imply that the prevalence of firm growth barriers decrease past 36 employees. This is likely due to that our sample is representatively stratified across firm size, meaning in turn that we may expect to have relatively few observations for larger firms. This infers, as a consequence, that estimates for these firms can be expected to have relatively high variance, as also observed in our results. In extension, this means that we can only partially confirm our first hypothesis regarding the presence of a Penrose effect.

Moreover, we find that larger firms (67-249 employees) struggle mainly with foreign competition, price-cutting from other firms, finding appropriate labor and accessing credit. This latter result may, at first glance, seem rather counterintuitive as larger firms should, *ceteris paribus*, have better credit ratings than smaller firms. Upon further analysis, we find that this is the case – larger firms are indeed more likely to both apply for and to be granted credit. This leads us to believe that these firms face constraints relating to the conditions of bank credit, rather than its overall availability.

Conversely, we find that smaller firms (6-66 employees) are mainly competing domestically, whereas this competition is largely driven by price-cutting. Next, we also find

that they struggle with insufficient consumer demand. Within this group, we also find that firms with 28-36 employees are the most likely to face growth barriers relating to accessing external capital, infrastructure and finding appropriate labor. Additional analysis reveals that these firms mainly struggle with finding labor with sufficient education, experience and/or competence.

Furthermore, we find that top managers of firms which are 14 years or older are less likely than those of younger firms to face growth barriers relating to accessing credits, external capital and their current plant capacity. However, we also find that top managers of these firms are also *more* likely than those of younger firms to face growth barriers relating to finding appropriate labor, accessing infrastructure and finding time to plan and to strategize. Hence, we are only partially able to confirm our hypothesis that younger firms are more likely to face growth barriers compared to older firms. The estimates yielded for firm age are also small; not only in themselves, but also in comparison with other coefficients. In other words, although we find partial support for a learning effect among firms, this mechanism seems to be of a secondary nature. A possible explanation to this may be that all firms age, whereas only few firms grow or have growth ambitions (Davidsson 1989). In other words, we argue that firms must have growth ambitions in order to experience growth barriers, whereas most firms do not.

A major limitation of our study is that we observe *perceived* growth barriers, i.e., we do not observe the actual growth of firms, but rather perceptions of growth, as stated by top managers. This empirical approach has been criticized by researchers for being both inexact and for failing to explain the true causality of firm growth barriers (e.g., Kitching 2006; Bornhäll et al. 2016). Critics infer that although this method allows researchers and policy makers to collect information on whether firms experience growth barriers, it does not allow them to quantify this information to discern the severity of such barriers, nor how to approach them. This critique is of course justified, meaning that there are limitations as to what conclusions can be drawn from a perception-based study.

However, in spite of this limitation, we argue that there is still potential use of perception-based data in a range of research settings; for example, when researchers are interested in evaluating the dynamics between current institutions and firm growth. In these cases, a perception-based approach may not only be more convenient than a causal one, but may also be able to extract information which would otherwise be difficult, if not impossible, to study through other empirical approaches. Moreover, although we cannot discern the actual causal relationship between perceived firm growth barriers and firm growth, previous studies indicate that these two measures are closely related (Bartlett and Bukvič 2001; Hashi 2001; Ayyagari et

al. 2008; Ishengoma and Kappel 2011; Hessels and Parker 2013; Rehman 2014; Reppen 2015; Shibia and Barako 2017). In other words, although we cannot discern the flow of causality, we can likely make accurate predictions as to *which* firms are inhibited in their growth process based on which factors they perceive as constraining to growth.

For future research, we recommend that an in-depth analysis is undertaken with respect to of the finding that *perceived* growth barriers are weakly related to firm age. This is an interesting result given that firm age is a well-established and strong determinant of *actual* firm growth (e.g., Evans 1987a; Delmar et al. 2003). Moreover, this is a result which is not unique to this study, but has also been found in a number of previous studies, thereby inferring that this is a relationship which exists across different research settings and time periods (Lee and Cowling 2013; Lee 2014; Lee and Cowling 2015; Wang 2016). A plausible explanation to this may be that although firms do generally grow slower as they age, they are unlikely to perceive this as a problem.

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Appendix A

Table A1. Previous empirical research on perceived growth barriers.

Study	Period	Country or countries	Sample size	Firm size ^ψ	Sampling method	Empirical method	Outcome variable(s) ^ϕ	Focus	Results
Levy (1993)	1980/1990	Tanzania and Sri Lanka	57	All sizes	Personal interviews	Descriptive	Five point Likert scale	General growth barriers	Top managers perceive access to and cost of finance to be a growth barrier
Hay and Kamshad (1994)	1993	UK	408	0-249	Mail survey	Descriptive	Binary	Managerial capacity	Insufficient managerial capacity is a common growth barrier
Bryson et al. (1997)	1991	UK	2,028	1-500	Mail survey	Descriptive	Ten point Likert scale	General growth barriers	Availability and cost of finance is generally perceived to be a growth barrier
McCormick et al. (1997)	1989	Kenya	40	4-49	Personal interviews	Qualitative	Interview response	General growth barriers	Weak demand, poor financial system and lack of suitable premises are perceived as growth barriers
Bohatá and Mládek (1999)	1997	Czech Republic	100	> 5	Personal interviews	Descriptive	Five point Likert scale	General firm characteristics	Excess tax burden, access to credit and price of credit are perceived as growth barriers
Orser et al. (2000)	1994/1995	Canada	1,004	< 100	Telephone interviews	Probit regression	Binary	Top management characteristics	Female top managers and managers in older and smaller firms are more likely to face growth barriers
Bartlett and Bukvič (2001)	2000	Slovenia	173	2-249	Personal interviews	OLS regression	Firm growth	Firm growth	Perceived growth barriers regarding bureaucracy, taxes and cost of credit is negatively associated with firm growth
Hashi (2001)	1997	Albania	50	< 200	Mail survey	OLS regression	Firm growth	General growth barriers	Firms that face financial and institutional growth barriers exhibit lower employment and asset growth
Ačevska (2002)	2000	Macedonia	300	0-249	Mail survey	Descriptive	Five point Likert scale	General growth barriers	High taxes, low availability of loans, high labor costs, lack of liquidity and poor institutions are commonly perceived as growth barriers
Harris (2002)	Not specified	UK	6	25-100	Personal interviews	Qualitative analysis	Interview response	Regulation	Regulation is generally perceived as a growth barrier

Table A1. Continued. Previous empirical research on perceived growth barriers.

Study	Period	Country or countries	Sample size	Firm size ^ψ	Sampling method	Empirical method	Outcome variable(s) ^φ	Focus	Results
Mambula (2002)	Not specified	Nigeria	32	Not specified	Personal interviews	Descriptive	Binary	General growth barriers	Lack of finance, poor infrastructure and difficulty attaining factor inputs are commonly perceived as growth barriers
Sleuwaegen and Goedhuys (2002)	1995-1996	Côte d'Ivoire	185	All sizes	Personal interviews	Descriptive	Three point Likert scale	Firm size	Top managers perceive access to finance, insufficient market conditions, access to infrastructure and regulations to be growth barriers
Trulsson (2002)	1999	Three countries	54	5-60	Personal interviews	Descriptive	Three point Likert scale	General growth barriers	Top managers perceived access to finance to be a growth barrier
Fielden et al. (2003)	Not specified	UK	99	All firm sizes	Personal interviews	Qualitative	Interview response	Top management characteristics	Female top managers perceived negative attitudes and gender stereotypes to constitute growth barriers
Lechner and Dowling (2003)	1998/1999	Germany	10	All firm sizes	Personal interviews	Qualitative analysis	Interview response	Firm networks	Networking capacity constitutes a growth barrier for firms
Morrison et al. (2003)	Not specified	Australia	20	5-49	Personal interviews	Qualitative analysis	Interview response	General growth barriers	Institutions matter for firm growth
Moy and Luk (2003)	1998-1999	Hong Kong	200	< 200	Mail survey	Discriminant analysis	Seven point Likert scale	Firm development	Perceptions of growth barriers are carried over the lifecycle of firms
Pissarides et al. (2003)	1995	Russia and Bulgaria	437	≤ 200	Personal interviews	Multinomial logit	Binary	General growth barriers	Top managers perceive access to finance to be a significant growth barrier
Aidis (2005)	2000	Lithuania	332	0-49	Mail survey	Multinomial logit	Six point Likert scale	General growth barriers	The perceptions of different growth barriers within firms are correlated
Beck et al. (2005)	1999-2000	54 countries	4,255	> 5	Personal interviews	Random effects	Four point Likert scale	Firm size	Owners of smaller firms experience more financial constraints to growth
Rankin (2006)	1998	South Africa	325	< 40	Personal interviews	Probit regression	Binary	General growth barriers	Firms with lower costs are less likely to face growth barriers
Krasniqi (2007)	2002	Kosova	178	0-249	Personal interviews	OLS regression	Firm growth	Firm growth	Top managers of fast growing firms are less likely to experience growth barriers

Table A1. Continued. Previous empirical research on perceived growth barriers.

Study	Period	Country or countries	Sample size	Firm size ^ψ	Sampling method	Empirical method	Outcome variable(s) ^φ	Focus	Results
Okpara and Wynn (2007)	2006	Nigeria	396	Not specified	Mail survey	Correlation	Five point Likert scale	Top management characteristics	Top managers who perceive themselves as successful are less likely to face growth barriers
Reddy (2007)	2003/2004	Fiji	240	Not specified	Personal interviews	Descriptive	Five point Likert scale	General growth barriers	Top managers perceive a lack of financial security, experience and financial knowledge to be growth barriers
Ayyagari et al. (2008)	1999/2000	80 countries	79	> 4	Mail survey	OLS regression	Firm growth	General growth barriers	Firm growth is negatively associated with a perceived lack of finance
Hassanien and Adly (2008)	2005	Egypt	15	< 50	Mail survey	Descriptive	Binary	Access to finance	A majority of top managers perceive access to finance to be a growth barrier
Paul and Obeng (2008)	2002-2005	Ghana	500	4-50	Mail survey	Ordered logit	Six point Likert scale	General firm characteristics	Ownership, firm growth and R&D spending affect perceptions of growth barriers
Carter et al. (2009)	2005	UK	16,779	0-249	Mail survey	OLS regression	Five point Likert scale	Institutions	Top managers who rate their firm's competitiveness highly are more likely to face growth barriers
Harvie et al. (2010)	2009	8 countries	912	1-199	Mail survey	Descriptive	Five point Likert scale	General growth barriers	Top managers perceive product and price regulations to be growth barriers
Irwin and Scott (2010)	Not specified	UK	400	0-249	Telephone interviews	Descriptive	Binary	Top management characteristics	Top managers with low education and/or from ethnic minorities are more likely perceive finance as a growth barrier
Olawale and Garwe (2010)	Not specified	South Africa	361	1-200	Mail survey	Descriptive	Five point Likert scale	Young firms	Top managers generally perceive a lack of access to finance to be a growth barrier
Doern (2011)	2005	Russia	27	10-99	Personal interviews	Qualitative approach	Interview response	General growth barriers	Perceived growth barriers reduce growth intentions and postpone growth realization

Table A1. Continued. Previous empirical research on perceived growth barriers.

Study	Period	Country or countries	Sample size	Firm size ^ψ	Sampling method	Empirical method	Outcome variable(s) ^φ	Focus	Results
Hashi and Krasniqi (2011)	2002, 2005	6 countries	2,100	2-250	Mail survey	OLS regression	Firm growth	Institutions	Laggard economy firms face greater growth barriers relating to tax burden, corruption and organized crime
Ishengoma and Kappel (2011)	2003	Uganda	105	< 20	Personal interviews	Probit/logit	Sales growth	General growth barriers	Perceived limited access to markets is negatively associated with sales growth
Okpara (2011)	2007	Nigeria	211	Not specified	Mail survey	Probit regression	Binary	Firm exit	Top managers perceive access to finance and infrastructure to be growth barriers
Syed Shah et al. (2011)	2010	Malaysia	170	< 150	Mail survey	Factor analysis	Five point Likert scale	General firm characteristics	Top managers perceive access to finance and the poor quality of institutions as growth barriers
Athanasouli et al. (2012)	2005	Greece	546	All firm sizes	Personal interviews	Descriptive	Three point Likert scale	Corruption	Top managers of quarrying firms are more likely than others to perceive corruption as a growth barrier
Coad and Tamvada (2012)	2002-2003	India	Approx. 85,000	All firm sizes	Mail survey	Probit	Binary	General growth barriers	Top managers of older and larger firms are less likely to face growth barriers relating to demand and managerial problems
Gill and Biger (2012)	Not specified	Canada	219	< 150	Telephone interviews	OLS regression	Firm performance	General firm characteristics	Top managers of fast growing firms are more likely to face growth barriers
Xheneti and Bartlett (2012)	2004	Albania	110	> 5	Personal interviews	Factor analysis	Binary	Institutions	Employment regulations and insufficient institutions are commonly perceived as growth barriers
Hessels and Parker (2013)	2003	18 countries	7,673	0-249	Telephone interviews	OLS regression	Employment growth	Trade	Firms which trade and face demand constraints exhibit lower sales growth
Lee and Cowling (2013)	2007-2008	UK	7,670	0-249	Telephone interviews	Probit regression	Binary	Firm demographics	Firm characteristics account for most variation in perceived growth barriers across regions

Table A1. Continued. Previous empirical research on perceived growth barriers.

Study	Period	Country or countries	Sample size	Firm size ^ψ	Sampling method	Empirical method	Outcome variable(s) ^ϕ	Focus	Results
Afraz et al. (2014)	Not specified	Pakistan	24	Not specified	Personal interviews	Qualitative approach	Interview response	General growth barriers	Top managers perceive poor institutions to be a growth barrier
Alrabeei and Kasi (2014)	Not specified	Bahrain	200	11-250	Personal interviews	Descriptive	Binary	General growth barriers	Top managers perceive a lack of qualified human resources, finance and competition to constitute growth barriers
Rehman (2014)	2012	Pakistan	69	1-500	Personal interviews	OLS regression	Labor productivity	General growth barriers	Firms whose top managers report a lack of appropriate labor exhibit lower labor productivity
Lee (2014)	2007/2008, 2010	UK	4,858	0-249	Telephone interviews	Probit regression	Binary	High growth firms	Top managers of high growth firms are more likely to experience growth barriers
Lee and Drever (2014)	2012	UK	3,684	0-249	Telephone interviews	Probit regression	Binary	Firm demographics	Top managers in deprived areas are more likely to perceive finance as a growth barrier
Chinomona and Maziriri (2015)	Not specified	South Africa	30	All firm sizes	Personal interviews	Qualitative approach	Interview response	Top management characteristics	Female top managers perceive a lack of finance to be a growth barrier
Lee and Cowling (2015)	2006/2007, 2007/2008	UK	12,188	0-249	Telephone interviews	Probit regression	Binary	Firm demographics	Top managers of urban and rural firms experience different growth barriers
Nikolic et al. (2015)	2009-2010	Serbia	3,500	0-249	Mail survey	Descriptive	Binary	Innovation	Poor institutions constitute a commonly perceived growth barrier among top managers
Reppen (2015)	2012-2014	8 countries	6,917	5-99	Personal interviews	OLS regression	Sales growth	Infrastructure	Firms whose top managers consider their access to infrastructure to be good exhibit higher sales growth
Baporikar et al. (2016)	Not specified	Nambia	2	Not specified	Personal interviews	Qualitative analysis	Interview response	General growth barriers	Fighting, stealing and tax-levels were perceived as growth barriers
Wang (2016)	2006-2014	119 countries	73,000	< 100	Personal interviews	Probit regression	Binary	Growth barriers in developing countries	High growth SMEs are more likely to perceive financing as a growth barrier. Larger SMEs are less likely

to perceive finance and competition as growth barriers.

Table A1. Continued. Previous empirical research on perceived growth barriers.

Study	Period	Country or countries	Sample size	Firm size ^ψ	Sampling method	Empirical method	Outcome variable(s) ^φ	Focus	Results
Galati et al. (2017)	Not specified	Italy	15	All firm sizes	Mail survey	Forecasting and simulation	12 point Likert scale	General growth barriers	Top managers perceive a lack of human resources to be a growth barrier
Krešić et al. (2017)	2012-2014	7 countries	1,800	All firm sizes	Personal interviews	Descriptive	Four point Likert scale	General growth barriers	Top managers perceive competition from the informal sector to be the most pressing barrier to growth Negative perceptions of fairness, cost and efficiency of the judicial system is associated with lower firm growth
Shibia and Barako (2017)	2008	Kenya	2,536	< 50	Mail survey	OLS regression	Firm growth	General growth barriers	

Notes:

^ψ Firm size refers to the number of employees.

^φ Outcome variables refer to perceived growth barriers unless specified otherwise.

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