Growth and job creation at the firm level: Swedish SME data

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Received 29 March 2017
Revised 16 August 2017
10 November 2017
Accepted 3 February 2018

Abstract

Purpose – The purpose of this study is to investigate the association between firm sales growth and employment level as a proxy for job creation among small and medium-sized enterprises (SMEs).

Design/methodology/approach – The hypotheses were empirically examined by performing several univariate and multivariate regressions to investigate a large panel data set of 13,548 Swedish SMEs in four industry sectors in the four-year period from 2009 to 2012.

Findings – The results indicate that growth, in terms of sales, as a competitive advantage is positively related to the number of employees hired by the sampled firms. In addition, the size and age variables are also positively associated with the number of employees hired. The results support the suitability of implementing the resource-based view to explain job creation by SMEs.

Originality/value – While previous studies have mostly ignored the impact of these firm-level variables on job creation, the current study highlights the effect of firm-specific characteristics such as sales growth, size, age and industry. The authors use a combination of models to analyse a large cross-sectoral data set regarding the association, in SMEs, between the firms' sales growth and job creation.

Keywords Sweden, SMEs, Resource-based view, Job creation, Panel data, Firm growth, Entrepreneurship and small business management

Paper type Research paper

1. Introduction

It is well recognized that small and medium-sized enterprises (SMEs) play a crucial role in economic growth and employment generation (Beck *et al.*, 2005; Kongolo, 2010; Neumark *et al.*, 2011; Haltiwanger *et al.*, 2013; Decker *et al.*, 2014). Job generation by SMEs is a subject of interest to many parties, not least state and local policymakers (Henrekson and Johansson, 2010; Yazdanfar, 2011). Unsurprisingly, policymakers are keen to increase the number of start-ups (Ayyagari *et al.*, 2011). However, Lundström and Kremel (2009) demonstrated very high failure rates among SMEs in the first life-cycle stages. This suggests a need to consider not only the number of start-ups but also the effects of firm growth on employment rates.

Since the seminal work of Birch (1981), many investigations have treated small businesses as the main source of job creation at the macroeconomic level (Fu and Balasubramanyam, 2005; Kapsos, 2005; Haltiwanger *et al.*, 2013; Decker *et al.*, 2014; Aga *et al.*, 2015). As these empirical studies have paid little attention to the firm-level job generation factors that explain the influence of firm growth on employment level, the current study examines the role of firm-level growth in the generation of employment.

The extent to which different types of SMEs create jobs seems to vary between countries and socio-economic contexts (Ayyagari *et al.*, 2011), justifying the specific focus of this study on Swedish SMEs. In Sweden, SMEs are estimated to account for more than 99 per cent of

Management Research Review

2040-8269
DOI 10.1108/MRR-03-2017-0093

registered firms (Tillväxtverket, 2017). According to a report from Sweden's largest entrepreneurial organization (Förtagarna, 2013), SMEs have created more than four out of five new jobs in Sweden since 1990. Moreover, most Swedish SMEs are active in the service sector, which accounts for most economic activity in the Swedish economy, in contrast to the past when manufacturing was the largest economic sector.

The current study empirically investigates the association between firm growth and job creation among SMEs in Sweden. The study uses a comprehensive database of 13,548 SMEs operating in four industries over the 2009-2012 period. It contributes to the literature on the relationship between firm-level factors and job creation, suggesting that it is primarily fast-growing SMEs with high chances of survival that create jobs.

The article proceeds as follows: Section 2 presents the theoretical framework and previous empirical studies used to develop the hypotheses. Section 3 outlines the selection of variables, the hypotheses, the data sample and model specification. Section 4 reports the empirical results and the diagnostic validation tests. The final section concludes the article.

2. Framework of reference

2.1 Theoretical framework

The factors that affect job creation among firms may include internal and external firm-level variables, industry variables and market-related variables (Yazdanfar and Öhman, 2015). There are several theoretical perspectives on job creation. In this study, we focus on firm-level job creation determinants among SMEs, applying the resource-based view. According to this view, it is its specific combination of resources that mainly accounts for a company's competitive advantage and performance (Barney, 1991, 2001).

The concept of "resources" has a broad meaning, comprising both tangible and intangible resources, such as cash, retained earnings, firm networking, work experience, business reputation, information and knowledge (Wernerfelt, 1984; Conner and Prahalad, 1996; Liu *et al.*, 2010). However, these resources must be valuable, rare, non-imitable and non-substitutable (Barney, 1991), and in line with the resource-based view, the quality of the resource allocation process plays a significant role in determining firm performance (Bower *et al.*, 2005; Peteraf, 2005). For example, increased availability of resources in terms of capital generated by retained income enables firms to increase their capacity in various ways, such as by using new technology, entering new markets and acquiring labour (Castrogiovanni, 1996). Accordingly, its unique combination of resources, not least financial ones, may enable a firm to achieve competitive advantage and high performance in terms of sales, profitability and job creation capacity (Barney, 1991, 2001).

Investments made in hiring employees depend, like any other investments, on access to financial resources, i.e. equity capital and/or external financing. As firms' access to financial resources improves, their investment expenditures may increase, giving rise to competitive advantages and, in turn, increased demand for labour. This also means that firm growth, in terms of increased sales, can be seen as a competitive advantage that may create the conditions necessary for investing in hiring people, and that a firm' growth is likely to affect the number of employees hired when the need arises. This reasoning is in agreement with Moneta *et al.* (2013), who argued that sales growth drives employment growth. In the same vein, Schreyer (2000) argued that it is not new firm creation as such that mainly drives job creation but rather that the relatively small number of fast-growing new firms accounts for most net new job creation.

2.2 Previous empirical studies

Several previous studies have highlighted the significant role of high-growth SMEs in generating jobs. According to Birch (1981), who empirically investigated the contribution of small businesses in creating jobs, fast-growing small firms generated the most new jobs in the USA. Later research by Birch and Medoff (1994) confirmed that high-growth businesses accounted for roughly 70 per cent of the total increase in employment in the USA. Storey (1994), studying UK firms, found that a small number of surviving fast-growing firms accounted for most new jobs. Size, age, industry sector, legal form, location and ownership were also important factors affecting the employment growth of firms. Autio *et al.* (2000) investigated the role of high-growth firms in Finland over the 1994-1997 period. Their results indicate that high-growth firms increased their employment by more than 400 per cent. An investigation of the Swedish labour market found that rapidly growing start-ups created a significant number of new jobs (Davidsson *et al.*, 2001) and Funke *et al.* (1999) suggested that sales growth was positively associated with employment among German firms.

Investigating a number of firm-level factors using a sample of 6164 Greek manufacturing firms, Voulgaris *et al.* (2005) found significant positive relationships between employment growth and sales growth, profitability, size, reliance on debt and investment in fixed assets, respectively. At the same time, firm age was significantly and negatively related to employment growth. Moneta *et al.* (2013) investigated US-listed firms in the 1973-2004 period, finding that sales growth had a relatively strong influence on employment growth, R&D expenditure growth and operating income growth.

Previous empirical studies have examined, among firm-specific characteristics, firm-level financial determinants of job creation in SMEs. Nickell and Wadhwani (1991) analysed a sample of over 200 British manufacturing firms, suggesting a positive association between a firm's financial leverage level and its employment level. Their explanation was that higher leverage represents better access to financial resources, which, in turn, promotes more investment. In the same vein, Sharpe (1994) demonstrated that high interest rates and low firm financial leverage negatively affect employment, and Acemoglu (2001) proposed that financial constraints are a barrier to job creation, especially in young and innovative firms. Arnold (2002) reported that financial constraints caused by information asymmetry negatively influence the demand for labour, and Nickell and Nicolitsas (1999) found a negative relationship between the cost of capital and the employment level. Funke *et al.* (1999) argued that capital structure is related to employment decisions, and that higher debt asset ratios are negatively related to the number of employees. Focusing on the relationship between financial leverage and job creation, Yazdanfar and Öhman (2015) investigated firm-level determinants of job creation in 26,721 Swedish SMEs over the 2008-2011 period. Their results indicated that SMEs with higher financial leverage ratios and better access to liquidity tended to create more jobs than did firms with lower financial ratios and less access to liquidity. In addition, SME size and age were positively and significantly associated with the number of employees.

2.3 Hypothesis development

Firm growth can be assessed as an outcome of organizational development (Chan *et al.*, 2006), including internal and external resources that, in accordance with the resource-based view, help the firms achieve competitive advantage (Bower *et al.*, 2005; Peteraf, 2005). As indicated in the previous subsection, several studies from various countries (Birch and

Medoff, 1994; Funke *et al.*, 1999; Schreyer, 2000; Voulgaris *et al.*, 2005; Moneta *et al.*, 2013) have found a positive association between firm growth and job creation. Accordingly, the first hypothesis is formulated as follows:

H1. Firm growth positively affects the employment growth rate.

Based on the resource-based view, this study treats size as a proxy for access to financial resources because larger firms tend to have better access to equity capital and/or external financing (Yazdanfar and Öhman, 2015). Moreover, firm size is often used as an indicator of economies of scale (Ciriaci *et al.*, 2012), meaning that larger SMEs are more likely to employ people than are smaller SMEs. However, the results of previous studies regarding the impact of size on job creation are mixed. Haltiwanger *et al.* (2013) reported that small and large firms do not display any differences in net job creation. Aga *et al.* (2015), Pyo *et al.* (2016) and Dogan *et al.* (2017) found that size are negatively correlated with job creation, and Ciriaci *et al.* (2012) found that smaller innovative firms tend to grow more, and faster, than older firms in terms of employment. However, several previous studies have analysed firm-level data and found a positive association between firm size and employment level (Hall, 1987; Broersma and Gautier, 1997; Voulgaris *et al.*, 2005; Oliveira and Fortunato, 2006; Criscuolo *et al.*, 2014; Yazdanfar and Öhman, 2015). Based on the argument that firm size is an indicator of economies of scale, and on empirical findings from several previous studies, the second hypothesis is as follows:

H2. Firm size positively affects the employment growth rate.

Although Decker *et al.* (2014) argued that the contribution of start-ups and young businesses in creation of jobs is a complex process, age can be seen as an indicator of a firm's chances of survival (Majumdar, 1997). Previous studies have considered firm age to be positively related to employment growth rate (Broersma and Gautier, 1997; Oliveira and Fortunato, 2006; Yazdanfar and Öhman, 2015). Moreover, based on manufacturing survey data from Ethiopia, Bigsten and Gebreeyesus (2007) reported a non-linear relationship between firm age and net job growth rates, meaning that job growth increases with firm age for those over nine years. However, Criscuolo *et al.* (2017) suggested that young micro-firms, particularly those below three years of age, tend to grow more than older firms, and Voulgaris *et al.* (2005) and Aga *et al.* (2015) found that age is negatively correlated with job creation. Haltiwanger *et al.* (2013) reported that firm age is not associated with any differences in net job creation. In sum, previous research is not consistent in its findings. Nevertheless, based on the argument that firm age is an indicator of the chances of survival and empirical findings from several previous studies, our third hypothesis is as follows:

H3. Firm age positively affects the employment growth rate.

Moreover, a firm's growth can partly be explained by its industry affiliation and previous studies have suggested that the industry sector seems to affect employment among firms (Storey, 1994; Davidsson *et al.*, 2001; Bottazzi and Secchi, 2003b; Evangelista and Savona, 2003; Shiferaw and Bedi, 2013). The theoretical explanation is that the job creation is expected to vary across industries depending on variables such the type of technology and labour and capital intensively. This means that some industry sectors are more labour intensive than are others, and that SMEs in different industry sectors display differences in capital intensity (Yazdanfar and Salman, 2012). Based on empirical findings and the theoretical explanation, the following hypothesis is formulated concerning the role of industry affiliation in influencing job creation:

H4. Industry affiliation affects the employment growth rate.

3. Variable selection, data sample and model specification

3.1 Variable selection

The dependent variable, employment level, is proxied by the net number of employees per sampled firm (cf. Yazdanfar and Öhman, 2015). Applying the resource-based view, the current study suggests that the employment level is affected as described in the hypothesis development subsection. These variables are divided into two categories, the main independent variable and the control variables.

The main independent variable, sales growth, captures the national and international competitive condition of the sampled firms (Barney, 1991, 2001). Several proxies have been used to measure firm growth in previous research, for example, changes in sales, turnover and market share. Sales growth has commonly been regarded as a proxy for a firm's competitive advantage (Barney, 1991, 2001) and, in line with several previous studies (Funke *et al*., 1999; Bottazzi and Secchi, 2003a, 2003b; Coad, 2007; Yazdanfar and Öhman, 2015), the current study uses percentage change in sales as the measure of firm growth.

The control variables used here have commonly been used as predictors of SME behaviour. In the current study, the natural logarithm of the firm's book value of total assets is used as a proxy for firm size (cf. Moeller *et al*., 2004). The proxy variable for age is the natural logarithm of the number of years between the firm's inception and the year of data collection (cf. Kachlami and Yazdanfar, 2016). As the employment level is expected to vary across industries, a dummy variable is included in the models used (cf. Shiferaw and Bedi, 2013).

3.2 Data sample

Owing to data availability, the panel used in this study includes Swedish SMEs for the 2009-2012 period. Firm-specific annual data were obtained from Affärsdata, a comprehensive commercial database of financial data on Swedish firms. Previous studies have defined SMEs in various ways. The SME definition used here is that provided by Statistics Sweden (2016); accordingly, the target population comprises all non-financial firms with 1-199 employees in operation at the end of 2012 in four industry sectors: retail trade, wholesale, metal and health-care.

To avoid sampling bias, firms for which there were missing values, outliers (outside the interval defined by plus/minus five times the interquartile range) and/or inconsistent figures were excluded from the sample. The final sample therefore consisted of 13,548 SMEs for which information was complete. The industry classification is based on the Swedish Standard Industry Classification (SIC) codes (Statistics Sweden, 2016).

3.3 Model specification

Several statistical methods, including ordinary least squares (OLS), two-stage least squares (2SLS) regressions and fixed-effects regressions, were used in this study. OLS was used as a starting point, while the 2SLS regression was used to address potential endogeneity related to the data set. To examine the robustness of the OLS and 2SLS regression results, fixed-effects regression was used to control for all stable characteristics of the individual firms in the sample.

The following OLS model (Model 1) was developed to identify the variables that explain the employment level in the sample:

$$Employment\ level_{i,t} = \alpha_t + \beta_1 growth_{i,t} + \beta_2 Size_{i,t} + \beta_3 Age_{i,t} + \beta_4 Indus_{i,t} + \mu_{i,t} \quad (1)$$

where:

α_t = constant;

$Employment\ level_{i,t}$ = the natural logarithm of the number of employees in the current year;

$growth_{i,t}$ = the percentage change in sales (book value);

$Size_{i,t}$ = size of firm i at time t; measured as the natural logarithm of the firm's book value of total assets;

$Age_{i,t}$ = age of firm i at time t measured as the natural logarithm of the number of years since the firm's inception as of the year of data collection;

$Indus_{i,t}$ = dummy variable, industry; and

$\mu_{i,t}$ = error term.

To check the relevance of the unobservable individual effect, Lagrange multiplier (LM) tests were performed (which confirmed the robustness of the results obtained using the OLS regression, see Table III). As mentioned, the 2SLS regression was applied to deal with potential endogeneity. In line with Yazdanfar and Öhman (2015), we estimated our model using lagged growth and lagged return on assets (ROA) as instrumental variables. To check the endogeneity and robustness of using these instrumental variables, Wu–Hausman, Durbin, Basmann and Sargan statistics were performed (see Table III).

The equations of the 2SLS Models (2) and (3) are as follows:

$$Growth_{i,t} = \alpha_t + \beta_1 Size_{i,t} + \beta_2 Age_{i,t} + \beta_3 Indus_{i,t} + \beta_4 lagged\ growth_{i,t} + \beta_5 lagged\ ROA_{i,t} + \mu_{i,t} \quad (2)$$

where the variables $Size_{i,t}$, $Age_{i,t}$ and $Indus_{i,t}$ are similar to those in Model 1.

$$Employment\ level_{i,t} = \alpha_t + \beta_1 growth_{i,t} + \beta_2 Size_{i,t} + \beta_3 Age_{i,t} + \beta_4 Indus_{i,t} + \mu_{i,t} \quad (3)$$

where all parameters are similar to those in Model 1.

To test the stability of the OLS and 2SLS regression results over the studied period, fixed-effects regression (Model 4) was implemented according to the following equation:

$$Employment\ level_{i,t} = \alpha_t + \beta_1 growth_{i,t} + \beta_2 Size_{i,t} + \beta_3 Age_{i,t} + \eta i \quad (4)$$

where all parameters are similar to those in the OLS model, and η_i represents the unobservable heterogeneity (individual effects) specific to each entity. To test the fixed-effects model, Wald and Hausman tests were performed (see Table III).

4. Empirical results

4.1 Descriptive summary statistics

The descriptive statistics for the variables included in the main model over the entire analytical period are presented in Table I. The sample consists of SMEs in the retail trade (approximately 47 per cent), wholesale (20 per cent), metal (21 per cent) and health-care (12

Industry	Employees	Growth	Size	Age
Retail trade				
Mean	8.05	0.012	8.11	22.34
Std. dev.	13.48	0.165	1.20	15.27
Obs.	25,776	25,776	25,776	25,776
N firms	6,444	6,444	6,444	6,444
% firms	47	47	47	47
Wholesale				
Mean	16.86	0.021	9.40	25.91
Std. dev.	26.64	0.225	1.57	17.50
Obs.	10,700	10,700	10,700	10,700
N firms	2,675	2,675	2,675	2,675
% firms	20	20	20	20
Metal				
Mean	13.60	0.106	8.68	23.83
Std. dev.	20.96	0.149	1.38	15.00
Obs.	11,168	11,168	11,168	11,168
N firms	2,792	2,792	2,792	2,792
% firms	21	21	21	21
Health-care				
Mean	3.31	0.035	7.68	15.66
Std. dev.	6.22	0.186	0.96	9.53
Obs.	6,548	6,548	6,548	6,548
N firms	1,637	1,637	1,637	1,637
% firms	12	12	12	12
Total				
Mean	10.36	0.036	8.43	22.55
Std. dev.	18.46	0.182	1.41	15.39
Obs.	54,192	54,192	54,192	54,192
N firms	13,548	13,548	13,548	13,548
% firms	100	100	100	100

Notes: Employment level = number of employees in the current year; growth = the percentage change in sales (book value); size = size of firm *i* at time *t*, measured as the natural logarithm of the firm's book value of total assets; and age = the number of years since the firm's inception as of the year of data collection. A single digit Swedish SIC has been used to categorize the SMEs

Table I.
Descriptive statistics, 2009-2012

per cent) industries. This means that service-sector SMEs are overrepresented in the sample, illustrating the importance of this sector to the Swedish economy.

The sampled firms, on average, employed approximately 10 people each. The wholesale firms had the highest employment level (17 people each), while health-care firms had the lowest employment level (three people each). On average, the sampled firms tended to grow, in terms of sales, by around 4 per cent per year during the 2009-2012 period. On average, firms in the metal industry achieved the highest growth rate (11 per cent), while firms in the retail trade industry achieved the lowest (1 per cent).

Table I shows variation in firm size, in terms of the logarithm of total assets, between the industry sectors. Firms in the wholesale industry appear to be larger than the other firms. The average age of the sampled firms was approximately 22 years. Firms in the wholesale industry seem to be older and those in the health-care industry younger than firms in the other industries.

As shown in Table I, the mean values of the variables number of employees and size in the complete sample are higher than the respective standard deviations, while the mean values of the growth and age variables are lower than the respective standard deviations.

4.2 Correlation results

An analysis was conducted to establish correlations between the variables and to examine the risk of first-order collinearity and multicollinearity among the variables. Table II presents the correlation matrix, which indicates that the employment variable is positively and significantly related to sales growth, size and age. The sampled high-growth SMEs tend to employ more workers than do the other firms, as do the larger and older firms. As size and age are positively related, it can be concluded that the older SMEs are more likely to be the larger ones. Growth and size are positively related, whereas growth and age are negatively related. As can be noted from the correlation analysis, the correlation coefficients of most explanatory variables are rather low.

4.3 Ordinary least squares, two-stage least squares and fixed-effects results

Table III shows the OLS, 2SLS and fixed-effects results concerning the impact of the independent variables on the number of employees at the 1 per cent level. Regardless of the differences in the magnitude of the coefficients, the results of the regressions confirm a statistically significant impact of the independent variables on the dependent variable in the four industry sectors investigated. The explanatory power in explaining the per cent of the total variation in the dependent variable is expressed in adjusted R^2. As shown in Table III, the OLS model has the highest explanatory power (43 per cent). The figures for the equation 2 2SLS regression and the fixed-effects model are 17 and 42 per cent, respectively.

Consistent with *H1*, the results suggest that growth positively and significantly affects the employment level, implying that the higher the firm growth rate, the higher the number of employees. As indicated by the results of the fixed-effects regression, the sign of the association between the growth and employment variables is stable across the entities considered in the analysis. In agreement with *H2*, the

Variables	Employment	Growth	Size	Age
Employment	1.0000			
N	54,192			
Growth	0.0478***	1.0000		
p-value	0.0000			
N	54,192	54,192		
Size	0.6355***	0.0446***	1.0000	
p-value	0.0000	0.0000		
N	54,192	54,192	54,192	
Age	0.2752***	−0.0696***	0.2512***	1.0000
p-value	0.0000	0.0000	0.0000	
N	54,192	54,192	54,192	54,192

Notes: ***Correlation is significant at the 1 per cent level (two-tailed). Employment level = the natural logarithm of the number of employees in the current year; growth = the percentage change in sales (book value); size = size of firm *i* at time *t*, measured as the natural logarithm of the firm's book value of total assets; and age = the natural logarithm of the number of years since the firm's inception as of the year of data collection

Table II.
Results of correlation analysis, 2009-2012

Table III.
OLS, 2SLS regression and fixed-effects results, 2009-2012

OLS model (Model 1) Dependent variable	Employment	2SLS regression model Dependent variable	First equation 2SLS (Model 2) Growth	Second equation 2SLS (Model 3) Employment	Fixed-effects model (Model 4) Dependent variable	Employment
Constant	−2.6020***	Constant	−0.3788***	−2,5066***	Constant	0.2392***
p-value	(0.000)	*p*-value	(0.000)	(0.000)	*p*-value	(0.000)
Std. Err.	0.0448	Std. err.	0.0077	0.0448	Std. err.	0.0406
Growth	0.2312***	Growth		3.3100***	Growth	0.0371***
p-value	(0.000)	*p*-value		(0.000)	*p*-value	(0.000)
Std. Err.	0.0194	Std. err.		0.4841	Std. err.	0.0049
Size	0.4603***	Size	0.0129***	0.4176***	Size	0.1400***
p-value	(0.000)	*p*-value	(0.000)	(0.000)	*p*-value	(0.000)
Std. Err.	0.0026	Std. err.	0.0008	0.0078	Std. err.	0.0049
Age	0.2299***	Age	0.0138***	0.2298***	Age	0.0740***
p-value	(0.000)	*p*-value	(0.000)	(0.000)	*p*-value	(0.000)
Std. Err.	0.0051	Std. err.	0.0016	0.0118	Std. err.	0.0072
Industry	−0.0764***	Industry	0.0071***	−0.1007***		
p-value	(0.000)	*p*-value	(0.000)	(0.000)		
Std. Err.	0.0026	Std. err.	0.0008	0.0060		
Adj. R^2	0.4276	Laggrowth	0.0661		Adj. R^2	0.4179
F-value	10,123.1	*p*-value	(0.000)		*F*-value	445.77
p-value	(0.000)	Std. err.	0.0087		*p*-value	(0.000)
No. obs.	54,192	LagROA	0.0126		No. obs.	54,192
Root MSE	0.8154	*p*-value	(0.148)		*F* test χ^2	8129.0
Mean VIF	1.05	Std. err.	0.0058		*p*-value	(0.000)
LM test	0.8154	Adj. R^2	0.0206	0.1651	Wald χ^2	8505.2
p-value	(0.000)	*F*-value χ^2	115.01	13,902.7	Wald *p*-value	(0.000)
		p-value	(0.000)	(0.000)	Hausman test χ^2	2778.8
		No. obs.	27,099	27,099	Hausman *p*-value	(0.000)
		Root MSE	0.1751	0.9825		
		Instrument validity test				
Tests of endogeneity						
Wu–Hausman χ^2	61.82	Basmann χ^2	0.2065			
Wu–Hausman *p*-value	(0.000)	Basmann *p*-value	(0.6496)			
Durbin (score)	61.82	Sargan (score)	0.2065			
Durbin *p*-value	(0.000)	Sargan *p*-value	(0.6496)			

Notes: ***Coefficients are significant at 1 per cent level. Employment level = the natural logarithm of the number of employees in the current year; growth = the percentage change in sales (book value); size = size of firm *i* at time *t*, measured as the natural logarithm of the firm's book value of total assets; and age = the natural logarithm of the number of years since the firm's inception as of the year of data collection. Indus = industry dummy variable; Laggrowth = lagged growth; LagROA = lagged return on assets; Adj. R^2 = adjusted *R*-square; VIF = the variance inflation factor; and LM test = Lagrange multiplier test

coefficients for the estimated size variable are significantly positive, confirming that larger SMEs, in terms of total assets, tend to hire more employees. Similarly, the impact of the age variable on the employment variable is significantly positive, supporting *H3*. Finally, as indicated by the OLS and 2SLS regression results, industry has an effect on the employment rate, which is in line with *H4*.

The validity tests, namely, the *F*-statistic, the variance inflation factor (VIF), LM, Wu–Hausman, Durbin, Basmann, Sargan, Wald and Hausman tests confirm the overall robustness of the model specifications at the 5 per cent significance level. The results of the fixed-effects regression estimation indicate stable coefficients over the study period. Moreover, the Basmann and Sargan tests indicate no evidence of over-identifying restrictions, while the Wald test indicates good goodness of fit. Finally, using the 2SLS and fixed-effects regressions enabled us to overcome the shortcomings related to the OLS model.

5. Discussion and conclusion

This study empirically examines the association between sales growth and employment as a proxy for job generation. In addition, three control variables were included. Three models were used to analyse the data set of 13,548 SMEs for the 2009-2012 period.

The overall findings indicate that, on average, the employment level among the sampled firms is significantly positively related to sales growth, suggesting that growing SMEs tend to hire more employees than do other firms. This result is in line with those of previous studies from various countries (Birch and Medoff, 1994; Funke *et al.*, 1999; Schreyer, 2000; Voulgaris *et al.*, 2005; Moneta *et al.*, 2013), further indicating that SMEs that achieve competitive advantage have better opportunities to invest in hiring employees. In addition, the size and age control variables included in the estimations positively influence the employment level. Taken together, this indicates that larger, established, high-growth SMEs are more likely to hire employees than are other firms.

The results concerning the impact of size and age on employment rate support those of a number of previous studies (Hall, 1987; Broersma and Gautier, 1997; Oliveira and Fortunato, 2006; Criscuolo *et al.*, 2014; Yazdanfar and Öhman, 2015), although they stand in contrast to the results of Aga *et al.* (2015), Pyo *et al.* (2016) and Dogan *et al.* (2017) regarding the size variable, and the results of Voulgaris *et al.* (2005) and Aga *et al.* (2015) regarding the age variable. The positive effect of size on employment level implies that larger SMEs may be better placed than smaller ones to obtain financial resources, i.e. equity capital and/or external financing and to use economies of scale to improve their performance in terms of creating jobs. In addition, older SMEs, in agreement with the resource-based view, acquire resources gradually over time and are more likely to have better access to financial and other resources than are younger firms (Autio, 2005; Yazdanfar and Öhman, 2015). Moreover, the significant impact of industry affiliation on employment rate is consistent with results obtained by Evangelista and Savona (2003).

This study, focusing on firm-level conditions required to generate jobs, supplies insights into the association between firm growth and employment rate that might be useful to state and local policymakers. We argue, in line with Funke *et al.* (1999) and Schreyer (2000), that the main source of job creation is high-growth SMEs with high chances of survival. Based on our empirical findings, policymakers should support SMEs by identifying key obstacles to growth and by helping SMEs to overcome these obstacles. As larger and older SMEs tend

to create more jobs than do their smaller and younger counterparts, policies should be designed to increase the number of high-growth SMEs that are likely to survive, rather than focusing merely on increasing the number of start-ups. This is particularly relevant, as Lundström and Kremel (2009) demonstrated very high failure rates among "new-born" SMEs.

As policy initiatives alone are insufficient to create a conducive business environment for SME growth, policymakers should cooperate with entrepreneurs, researchers and other parties. In addition, firm managers can achieve competitive advantages supportive of growth by applying a resource-based view (cf. Conner and Prahalad, 1996; Barney, 2001) to establish sustained business and competitive projects with the intention of creating new jobs.

Limitations associated with this study could serve as departure points for future research. The study sample consists of only four industry sectors, and this combination of industries may not reflect Swedish SMEs as a whole. Therefore, future research should examine other industry sectors as well. Studies from other countries are also encouraged. Owing to data availability, the current study treats only a four-year period. To address problems related to the time effect, future researchers could, if they succeed in accessing empirical data, consider longer periods of time. Because of data limitations, this study could not take into account managerial, strategic or organizational explanatory variables that may affect the level of employment among the sampled SMEs. Future research could therefore productively consider other explanatory variables as well.

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