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Profitability determinants among micro firms: evidence from Swedish data

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Abstract

Purpose – The purpose of this paper is to investigate the variables affecting firm profitability, applying the seemingly unrelated regression method to a large sample of approximately 87,000 observations covering 12,530 non-financial micro firms operating in four industry sectors, from 2006 to 2007.

Design/methodology/approach – The study considers profitability determinants at the firm as well as industry affiliation levels in examining hypotheses developed from resource-based approaches. Seemingly unrelated regression (SUR) was used to detect the combination of variables that best estimated the impact of the explanatory variables on the dependent variable.

Findings – The findings indicate that while firm size, lagged profitability, growth, and productivity positively influence profitability, firm age and industry affiliation negatively influence it. The empirical results suggest that productivity is the most significant determinant of profitability. These results are fairly robust across the various industry sectors covered in the study and are largely consistent with the hypotheses developed from the resource-based approach.

Research limitations/implications – The current study addresses an issue that is relevant to various stakeholders, including managers, investors, and debtholders, and may facilitate further research in similar areas of small business studies.

Practical implications – The question of what factors determine profitability should accordingly be one of high priority for both researchers and practitioners, including managers, investors, debt holders, and policy makers.

Originality/value – Most of previous studies of profitability determinants were actually performed in the industrial organization discipline. This study examines the impact of internal determinants including firm size, age, and sector on firm profitability from a managerial perspective. Unlike the other approaches, this approach suggests that firm performance is mainly determined by internal rather than external variables.

Keywords Sweden, Small enterprises, Profit, Business development, Profitability determinants, Growth, SUR method, Productivity, Micro firms

Paper type Research paper

1. Introduction

Firm profitability is generally regarded as an important precondition for long-term firm survival and success; moreover, the variable significantly affects the firm's achievement of other financial goals. Another factor explaining the importance of firm profitability is its effect on economic growth, employment, innovation, and technological change. However, due to increasing competition, improved efficiency, and pricing pressure, firms are experiencing greater difficulty attaining the required profitability. The question of what factors determine profitability should accordingly be one of high priority for both researchers and practitioners, including managers, investors, debt holders, and policy makers. Despite the growing body of research focusing on the variables associated with firm profitability, the issue remains an open question in the empirical literature. Previous studies have empirically examined the question from various points of view; however, differences, for example, in the

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theoretical perspective, samples, measures of variables, and methodologies applied, make direct comparisons of the results of these studies difficult. These studies are mainly based on small samples of large manufacturing firms. The current study extends previous research, using a novel and more reliable econometric approach and a large sample of unlisted micro firms in four industries. Despite the crucial and growing role of micro firms in the Swedish economy, where they account for over 78 per cent of firms (SCB, 2011), little research attention has been paid to their profitability determinants. To empirically investigate the above issues, the present research applies the resource-based view (RBV) with a management perspective and focuses on firm-level profitability determinants, investigating the influence of a set of variables on profitability.

The study consists of six sections. Section 1 describes the background of the study, while Section 2 presents its purpose.

Section 3 describes the theoretical framework in detail and reviews previous empirical literature. Section 4 discusses the selection of variables, hypotheses, data collection, sample, and model specifications. The empirical and analytical results are presented in Section 5. Finally, the conclusions and implications of the research are presented in Section 6.

2. Purpose of the study

This study investigates the influence of a set of variables on profitability, empirically examining the profitability determinants of Swedish micro firms at the firm level.

3. Theoretical framework and review of previous literature

3.1 Theoretical framework

According to theory, the variables that might explain firm profitability can be classified into three main categories: firm-specific characteristics, industry variables, and market-related variables. Many attempts have been made to investigate the roles of these variables in explaining firm profitability. There are several broad theoretical perspectives on firm profitability: the structure-conduct-performance (SCP), market-based view (MBV), strategy-structure-performance (SSP), organization-environment-structure-performance (OESP), and RBV perspectives. While traditional approaches such as the SCP and MBV perspectives emphasize the role of industry characteristics in explaining firm profitability, the RBV stresses the importance of firm-level variables (Wernerfelt, 1984; Barney, 1991; Mahoney and Pandian, 1992; Amit and Schoemaker, 1993; Peteraf, 1993). For data availability reasons, the present research is based on the RBV and focuses on a few variables classified as firm-level profitability determinants. Unlike the other approaches, this approach suggests that firm performance is mainly determined by internal rather than external variables (Barney, 1991). In other words, the RBV explains firm performance in various terms, for example, explaining profitability mainly with reference to specific firm-level characteristics, resources, and capabilities (Jovanovic, 1982; Wernerfelt, 1984). According to the RBV, firms follow heterogeneous historical paths and, as a result, create different qualifications that affect their capabilities in different ways (Jovanovic, 1982; Wernerfelt, 1984). Successful firms in an industry are successful because they can access a range of resources and thus gain competitive advantages. In this context, "resources" refers to all tangible and intangible assets, such as cash, loans, capabilities and qualifications, organizational processes, firm attributes, information, and knowledge (Wernerfelt, 1984).

Accordingly, the strategic goal of any firm is to organize a unique combination of resources that increases its competitive capacity, leading to higher profitability (Barney, 1991).

3.2 Previous empirical studies

Several empirical studies have attempted to identify firm profitability determinants, focusing on firms in various industry sectors and in various periods (e.g. Adams and Buckle, 2003; Phillips and Sipahioglu, 2004; Goddard *et al.*, 2005). These studies can be classified in two major streams. The first group of studies focuses on internal determinants, i.e. factors affected by management decisions (see e.g. Rumelt, 1991; Mahoney and Pandian, 1992; McGahan and Porter, 1997). Studies in the second stream concentrate mainly on external determinants, i.e. factors that reflect the market, business, and economic environment in which the firms operate (Scherer, 1980; Bowman and Helfat, 2001; McGahan and Porter, 2002; Hawawini *et al.*, 2003). Most of these studies of profitability determinants were actually performed in the industrial organization discipline. However, since the scope of any study is necessarily limited by the objective, theoretical framework, and data availability, the literature review considers only the most recent and relevant empirical studies based on internal profitability determinants at the firm level. These studies examine the impact of internal determinants including firm size, age, and sector on firm profitability from a managerial perspective.

For example, McDonald (1999) examined the profitability determinants of Australian manufacturing firms, focusing on both the persistence and cyclicality of firm profitability over the 1984-1993 period. The study finds that lagged profitability and industry affiliation are the main profitability determinants and provides indications that firm profitability is characterized by cyclicality.

Similarly, Goddard *et al.* (2005) used panel data on manufacturing and service sector firms in Belgium, France, Italy, and the UK for the 1993-2001 period, applying a dynamic panel model to identify firm profitability determinants. Their research, which was based on industrial economics, strategic management, accountancy, and finance approaches, suggests that while a firm's size and gearing ratio are negatively related to profitability, its market share and liquidity positively influence profitability.

Ito and Fukao (2006) studied the determinants of firm profitability in Japan using a sample including 2000 firms for the 1989-2002 period. They proposed that profitability was positively associated with size measured in terms of log of sales, age, and local procurement.

Asimakopoulos *et al.* (2009) used data on 191 Greek non-financial firms listed on the Athens Stock Exchange for the 1995-2003 period. Applying panel data estimation techniques, they found that firm size, sales growth, and investment positively affected profitability. In addition, leverage, current assets, EMU participation, and the adoption of the euro were negatively related to profitability.

To identify the profitability determinants, Stierwald (2010) employed a data set including 961 large Australian firms for the 1995-2005 period. The author implemented a random- and fixed-effect regression including lagged profit, productivity, size, and industry affiliation as explanatory variables. His findings suggest that lagged profit, productivity, and size play major roles in explaining profitability, whereas the effect of industry affiliation is trivial.

The findings of previous studies of profitability determinants, regardless of the underlying theory applied, are summarized in the following section.

4. Selection of variables, hypotheses, the data, sample, and model specifications

4.1 Dependent variable

Return on assets (ROA) is used in this study as a proxy for the dependent variable, i.e. profitability, defined as the firm's book value of net profit after tax divided by total assets.

4.2 Independent variables

The six variables identified from the relevant literature are hypothesized to influence firm profitability.

4.2.1 Firm size. Based on the RBV, we expect a positive relationship between firm size and profitability, because the larger the firm, the better its access to resources and the more likely it is to take advantage of economies of scale to diversify its product range, resulting in increased profitability. However, the findings of previous studies are mixed regarding this possibility. For example, while Gschwandtner (2005), Ito and Fukao (2006), Nunes *et al.* (2009), Asimakopoulos *et al.* (2009), and Stierwald (2010) find that firm size significantly and positively influences profitability, Jensen and Murphy (1990), Pi and Timme (1993), Dhawan (2001), and Goddard *et al.* (2005) predict an inverse relationship between firm size and profitability.

Firm size can be measured using several proxies, for example, assets, sales, and employees. In the present study, firm size is measured as the natural logarithm of the firm's book value of sales. Based on this theoretical background, the following hypothesis is formulated:

H1. A firm's size positively influences its profitability ratio.

4.2.2 Firm age. According to the RBV, the older the firm, the more easily it can acquire resources over time (Autio, 2005). This is because firm age is associated with, for example, greater experience, more information, better reputation, and greater access to business networks and financial institutions, all of which help the firm overcome limited access to resources and operate more efficiently (Curran *et al.*, 1993). Studies that examine the relationship between firm age and profitability have produced mixed results. While some of these find that age and profitability are negatively related, others, such as Claver *et al.* (2002) and Ito and Fukao (2006), find a positive and significant relationship between them.

Based on this theoretical background, using the natural logarithm of the number of years since firm inception as the proxy variable for age, the following is hypothesized:

H2. According to the RBV, a firm's age positively influences its profitability.

4.2.3 Growth. According to arguments presented in previous research, the relationship between firm growth and profitability can be positive or negative (Delmar *et al.*, 2003; Wiklund *et al.*, 2003). Empirical studies of the relationship between firm growth and profitability are rare and also tend to be ambiguous and vague in their findings. For example, Geroski *et al.* (1997), Fitzsimmons *et al.* (2005), Claver *et al.* (2002), Samiloglu and Demirgunes (2008), and Asimakopoulos *et al.* (2009) establish a positive relationship between firm growth and profitability. On the other hand, research performed by Weisbord (1994), Markman and Gartner (2002), and Coad (2007) suggests no association between the variables. Furthermore, Hoy *et al.* (1992) and Kaen

and Baumann (2003) even find a significant and negative relationship between growth and profitability:

H3. In agreement with the RBV, greater firm growth implies better access to resources, which positively influences profitability.

4.2.4 Lagged profitability. Lagged and current profitability are somewhat related, because past-year profitability implies more resources in terms of, for example, increased access to liquidity, better relationships with customers, and market share. Thus lagged profitability is expected to have a positive impact on current profitability. A number of previous studies, for example, by Bothwell *et al.* (1984) and Fenny and Rogers (1999), found a positive relationship between lagged and current profitability:

H4. According to the RBV, a firm's lagged profitability positively influences its current profitability.

4.2.5 Productivity. Theoretically, profitable firms use all available resources efficiently and exploit all opportunities to maximize profits (Jovanovic, 1982). Thus, profitable firms are those that are more productive and cost effective in their operations and management (Demsetz, 1973). Productivity also gives rise to comparative advantage and greater potential for investment. Previous empirical research has found that productivity is the key variable explaining profitability (Stierwald, 2010).

The proxy for productivity, i.e. total factor productivity (TFP), has been computed by dividing the book value output (value added) by the labour cost (i.e. wages and salaries) plus capital cost (i.e. capital investment income, interest, and depreciation):

H5. A firm's productivity positively influences its profitability ratio.

4.2.6 Industry affiliation. All mentioned theoretical approaches agree regarding inter- vs intra-industrial variation in firm profitability (Porter, 1980; Barney, 1991; Hunt and Morgan, 1995). Industry-specific effects on profitability can arise due, for example, to concentration levels, product differentiation, and entry barriers, all of which determine the degree of competition and firm profitability. However, each approach suggests a different explanation of the link between industry affiliation and profitability. According to the RBV, industry affiliation has limited explanatory power for profitability, and firm characteristics play an active role in creating a unique and complex portfolio of assets to achieve superior profits (Prahalad and Hamel, 1990):

H6. A firm's industry affiliation influences its profitability ratio.

4.2.7 Sampling. The data used in this paper were collected from database "Affärsdata" for the 2006-2007 period. The data set includes detailed balance sheet, income statement, and other financial data on Swedish firms. The original data set covered 95,383 non-financial micro firms. However, in the interest of minimizing the risk of sample selection bias, the following selection criteria were applied to the original sample.

To avoid including non-operational firms in the sample, we included only firms with one to ten employees, annual operating revenue >SEK120,000, and total

assets >SEK100,000. Firms for which there were missing data or abnormal observations were removed from the sample.

Data availability limits the sample to 12,530 micro firms represented by approximately 175,000 observations from four industry sectors classified at the one-digit level: healthcare (29.7 per cent of the total number of firms), transport (28.1 per cent), manufacture of metallic products (17.6 per cent), and retail trade (24.6 per cent) sectors. Descriptive statistics for the full set of variables included are presented in Table I.

4.2.8 Model specifications. Seemingly unrelated regression (SUR) was used to detect the combination of variables that best estimated the impact of the explanatory variables on the dependent variable. The two following models were constructed for the complete sample and for each industry sector.

Model for the complete sample:

$$\begin{aligned}\text{Profitability}_{i,t} = {} & \alpha_t + \beta_1 Size_{i,t} + \beta_2 Age_{i,t} + \beta_3 Growth_{i,t} \\ & + \beta_4 \text{Lagged profitability}_{i,t} + \beta_5 \text{Productivity}_{i,t} \\ & + Indus_{i,t} + \mu_{it}\end{aligned}$$

Model for the sample of each industry sector:

$$\begin{aligned}\text{Profitability}_{i,t} = {} & \alpha_t + \beta_1 Size_{i,t} + \beta_2 Age_{i,t} + \beta_3 Growth_{i,t} \\ & + \beta_4 \text{Lagged profitability}_{i,t} + \beta_5 \text{Productivity}_{i,t} + \mu_{it}\end{aligned}$$

where α_t = constant; $Size_{i,t}$ = size of firm i at time t; firm size (Size) is measured as the natural logarithm of the firm's book value of sales; $Age_{i,t}$ = age of firm i at time t; "Age" is the natural logarithm of the number of years since firm inception as of the year of data collection; $Growth_{i,t}$ = firm growth; Lagged profitability$_{i,t}$ = lagged profitability; Productivity$_{i,t}$ = productivity; $Indus_{i,t}$ = categorical variable, industry; μ = error term.

	Healthcare	Transport	Metal	Retail trade	Total	J-B p-value
No. of firms	3,716	3,524	2,210	3,080	12,530	0.000
Firms (%)	0.297	0.281	0.176	0.246	1.000	0.000
Employees (mean)	3.014	3.039	3.827	3.827	3.316	0.000
Employees (SD)	2.157	2.171	2.445	2.137	2.236	0.000
Age (mean)	18.206	18.181	20.325	21.931	19.488	0.000
Age (SD)	10.756	10.83	12.244	14.386	12.129	0.000
Profitability (mean)	0.091	0.190	0.145	0.112	0.134	0.000
Profitability (SD)	0.167	0.253	0.217	0.110	0.198	0.000
Growth (mean)	0.028	0.052	0.132	0.049	0.059	0.000
Growth (SD)	0.296	0.439	1.313	0.260	0.634	0.000
Lagged profitability (mean)	0.105	0.107	0.133	0.108	0.111	0.000
Lagged profitability (SD)	0.151	0.150	0.221	0.124	0.160	0.000
Productivity (mean)	1.179	1.233	1.347	1.279	1.248	0.000
Productivity (SD)	0.406	0.396	0.530	0.463	0.446	0.000

Notes: J-B p-values are reported for the Jarque-Bera normality test; H_0 = normality

Table I. Summary of descriptive statistics for the dependent and independent variables for each industry sector at the one-digit industry and total sample levels

5. Results of the empirical analysis

5.1 Results of the descriptive analysis

Table I summarizes the descriptive statistics for the dependent and independent variables for the sectors and the whole sample. The mean size of the sampled firms in terms of personnel is 3.3 employees (standard deviation 2 per cent), so the range of firm sizes included in the study is small. Moreover, the overall average firm age is approximately 19 years (standard deviation 12 per cent). The lack of substantial differences between the sectors in terms of size and age implies that the sample is characterized by homogeneity among the sectors. Mean profitability, the dependent variable, varies from 9 to 19 per cent, suggesting an average return on assets of approximately 13 per cent (standard deviation 19.8 per cent). Both the mean and standard deviation of current profitability are higher than those of lagged profitability, which are 11 and 16 per cent, respectively. Table II also reveals that the growth rate of sales varies considerably among sectors, averaging approximately 6 per cent, with a standard deviation of 63 per cent. However, the variation in mean productivity among the sectors is low.

5.2 Results of correlation analysis

The results of the correlation analyses examining the degree of multicollinearity among variables are presented in Table II. In general, the correlations between the firms' dependent and explanatory variables have the expected signs, except for the variable capturing firm age. Obviously, the independent variables firm growth, size, lagged profitability, productivity, asset turnover, and profitability are positively and significantly related. However, the relationship between firm age and profitability is significantly negative. In addition, as the values of the correlation coefficients, except for the correlation coefficient for productivity, are all below 0.5 in absolute terms, there is little evidence of multicollinearity amongst the variables.

	Profitability	Size	Age log	Growth sale	Lagged profitability	Productivity	Industry
Profitability	1	0.14**	−0.149**	0.168**	0.132**	0.386**	0.017*
	0.000	0.000	0.000	0.000	0.000	0.000	0.051
Size	0.14**	1	0.112**	0.073**	0.105**	0.186**	0.228**
	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age	−0.149**	0.112**	1	−0.07	−0.132	−0.072	0.107
	0.000**	0.000	0.000	0.000	0.000	0.000	0.000
Growth	0.168**	0.073**	−0.07	1	−0.357**	0.138**	0.024**
	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Lagged profitability	0.132**	0.105**	−0.132	−0.357	1	0.197**	0.023*
	0.0000	0.0000	0.0000	0.0000		0.0000	0.011
Productivity	0.386**	0.186**	−0.072**	0.138**	0.197**	1	0.104**
	0.000	0.000	0.000	0.000	0.000		0.000
Indus	0.017*	0.228**	0.107**	0.024**	0.023*	0.104**	1
	0.051000	0.000000	0.0000	0.0070	0.0110	0.000	0.000
	12,532	12,532	12,532	12,532	12,532	12,532	12,532
J-B *p*-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: *,**Coefficients are significant at the 5 and 0.01 per cent levels, respectively

Table II.
The results of correlation analysis

5.3 Results of the SUR models

5.3.1 Complete SUR model. The results of the complete SUR model are shown in Table III. Consistent with *H1*, *H3*, *H4*, and *H5*, the empirical findings confirm that the coefficients of the variables growth, size, lagged profitability, and productivity are significant and positive. Specifically, firms with higher productivity ratios will have higher profitability levels. On the other hand, contrary to *H2*, age has a significant and negative impact on profitability, indicating that younger firms tend to be more profitable than older ones. As expected, industry affiliation significantly affects profitability. However, although industry affiliation does affect firm profitability, comparing the coefficients of the explanatory variables for firms across sectors indicates a clear and consistent pattern for all explanatory variables across all industry sectors. In addition, the impact of industry affiliation is lower than that of the other variables.

The validity tests of the SUR model, i.e. the *F*-, Durbin-Watson, ANOVA, VIF, and J-B tests, confirm that the results are robust. In addition, the adjusted R^2 is relatively high, indicating that the explanatory variables have a significant ability to explain change in the dependent variable.

	Healthcare	Transport	Metal	Retail trade	Total
(Constant)	−0.2382108**	−0.316914**	−0.343656**	−0.046240**	−0.157361**
	0.000	0.000	0.000	0.001	0.000
Size	0.0117447**	0.0261025**	0.0233058**	0.0015088**	0.0115523**
	0.023	0.001	0.008	0.006	0.001
Age	−0.0157009**	−0.08823**	−0.010893*	−0.043244**	−0.053841**
	0.024	0.000	0.0395	0.000	0.000
Growth	0.0702882**	0.0715086**	0.0230496**	0.0391966**	0.0301467**
	0.0000	0.0000	0.0000	0.0000	0.0000
Lagged profitability	0.0248224	−0.0119146	0.1295141**	0.0728038	0.0573576
	0.069	0.585	0.000	0.000	0.000
Productivity	0.2591515**	0.3850301**	0.2219854**	0.1425938**	0.2510002**
	0.0000	0.0000	0.0000	0.0000	0.0000
Indus	–	–	–	–	–0.011420**
	–	–	–	–	0.0000
Adjusted R^2	0.49130	0.45396	0.42340	0.45680	0.37334
RMSE	0.1194052	0.1867557	0.1645799	0.0812591	0.1566215
χ^2	3,588.45	2,942.92	1,622.50	2,590.53	7,466.23
p-value	0.0000	0.0000	0.0000	0.0000	0.0000
F-test	596.94781	489.1515	269.56077	412.25399	1,065.7127
Significance	0.000	0.000	0.000	0.000	0.000
df	5	5	5	5	6
DurbinW	1.9651	1.8431	1.9809	1.8823	1.7615
ANOVA	0.0000	0.0000	0.0000	0.0000	0.0000
Mean VIF	1.160	1.083	1.466	1.139	1.189
J-B *p*-value	0.0000	0.0000	0.0000	0.0000	0.0000
n	3.716	3,526	2,210	3,080	12,532
Heteroskedasticity test	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, H_0; constant variance χ^2, (1) = 1,917.01, Prob > χ^2 = 0.0000; *p*-values are reported for the Jarque-Bera (J-B) normality test; H_0 = normality. *, **Coefficients are significant at 5 and 0.01 per cent levels, respectively

Table III. Summary of complete SUR model and SUR model of the relationship between the explanatory variables and profitability, by industry sector

According to resource-based theory, the results can be interpreted as indicating that a resource composition giving greater market access measured in terms of sales, higher past profitability, productivity, and growth potential gives rise to higher profitability, whereas age negatively affects profitability.

7. Conclusions

The current study addresses an issue that is relevant to various stakeholders, including managers, investors, and debt holders, and may facilitate further research in similar areas of small business studies. The empirical results from investigating a large sample of Swedish micro firms in four industry sectors suggest that firm size, growth, lagged profitability, and productivity positively influence firm profitability, while firm age negatively influences it. The findings further indicate that larger and younger firms with high productivity and growth are more likely to be profitable. The coefficients of all explanatory variables vary by industry, indicating profitability heterogeneities at the industry level. This study has found that firm productivity is the strongest determinant of profitability. The results are relevant for two reasons. First, the estimation results concerning different firm contexts confirm the findings of previous studies of firm profitability. Second, the present paper is based on a larger sample and uses a more reliable statistical technique than did previous studies, strengthening our knowledge of firm profitability.

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