DOES FIRM AGE AFFECT PROFITABILITY? EVIDENCE FROM TURKEY

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Abstract:

The objective of this study is to investigate the impact of firm age on the profitability of Turkish firms listed on Borsa Istanbul. Using a dataset covering the years between 2005 and 2014 and consisting of 302 non-financial firms per year on the average, a fixed effects model with robust standard errors is estimated. Results reveal that there is a negative and convex relationship between firm age and profitability measured by return on assets, return on equity or gross profit margin. This suggests that younger firms start to see a decline in their profitability from the beginning but they may become profitable again at an old age. Implications are provided.

Keywords:

Firm age, firm life cycle, financial performance, profitability, fixed effects model, emerging markets, Turkey

JEL Classification: L20, G30, C23

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1. Introduction

It is clear that aging leads to deterioration in the performance of living organisms. A natural question that arises is whether firms also see a decline in their capacity to compete as they get older (Loderer and Waelchli 2010). Indeed, the issue of financial performance differences between younger and older firms is an area of research that has attracted a great deal of attention among scholars from a wide range disciplines including economics, organizational studies and finance. Although progress has been made in understanding the relationship between firm age and performance, the research area has not reached maturity yet due to equivocality of existing theries and empirical findings. One reason for this fact is the scarcity of data on firm age in administrative datasets or surveys (Coad et al. 2013). It is also possible that firm age-performance relationship depends on a number of institutional factors and is thus country-specific (Majumdar 1997).

In line with the above, the objective of this paper is to complement the literature by empirically investigating the relationship between firm age and profitability in a developing country, Turkey. In Turkey, private sector is relatively new and state enterprises still constitute a significant part of the business environment. Moreover, as many other developing countries, Turkey suffers from institutional voids which in turn lead to market efficiencies and affect the way in which firms operate (Gonenc et al. 2007, Khanna and Rivkin 2011). For instance, personal relationships with customers and government, which are built throughout the firms' life are an integral part of conducting business in the country. The unique experience gained by older companies from operating in such environments filled with institutional voids might affect their financial performance since firms might have to fulfill many of the functions of well-established product, capital and labor markets by themselves. Hence, empirical results obtained from Turkish firms could be different than those obtained by studies employing samples from developed countries, and offer additional insight on firm age-profitability relationship.

The remainder of this paper is organized as follows. Section 2 provides a brief review of prior studies on the relationship between firm age and performance both in developed and developing countries. Section 3 describes the data and estimation methodology. Estimation results are presented in Section 4. The final section summarizes the main findings of the study and concludes.

2. Literature Review

Theories predicting how a firm's performance is affected by its age can be grouped into three broad categories. One stream of research suggests that older firms have better financial performance because they are more experienced and enjoy the benefits of "learning by doing" (Coad et al. 2013, Vassilakis 2008). Moreover, younger firms are prone to "liabilities of newness" which refer to a number of poorly understood factors leading to higher failure rates (Stinchcombe 1965). A second strand of literature supports the view that older firms enjoy better performance and suggests that there might be "selection effects" which arise when less productive firms are forced to exit the business leading to higher average productivity in the cohort even if the productivity levels of the individual firms do not change over time (Jovanovic 1982). A third stream of research, however, suggests that aging can have a negative impact on firms' financial performance due to "inertia effects" leading firms to become inflexible and have difficulties in fitting the rapidly changing business environment in which they operate (Barron et al. 1994). Given the equivocality of these existing theories, the relationship between

a firms' financial performance and its age is a question that remains to be answered empirically.

Early empirical studies often treated firm age and size as measures of the same phenomenon in that younger firms tend to be smaller and vice versa. Later on, studies started to directly employ firm age as an independent variable in models investigating firm dynamics from different angles (Coad et al. 2013). For instance, there is a large literature suggesting a negative relationship between firm age and growth rates. It has been documented that young firms have higher average growth rates provided that they survive (Ouimet and Zarutkskie 2014). There are also studies suggesting that as firms get older, investor uncertainty and the variability of stock returns tend to decrease (Adams et al. 2005, Cheng 2008, Pástor and Veronesi 2013). It has also been empirically documented that older firms face lower cost of capital (Hadlock and Pierce 2010) and that plant failure rates decrease as firms grow older (Dunne et al. 1989).

The issue of actual profitability of older firms has received relatively less attention in the literature. In their study, Loderer and Waelchli (2010) investigated the relationship between firm age and performance using a dataset consisting of 10,930 listed US firms and covering the years between 1978 and 2004. Their empirical results showed that as firms get older, their return on assets, profit margins, and Tobin's Q ratios deteriorate. On the contrary, Coad et al. (2013) found that older firms enjoy higher productivity and profits when they investigated the relationship between firm age and performance measured by the ratio of profits to sales in Spanish manufacturing firms for the period 1998-2006.

Empirical studies focusing on developing countries are fewer in number compared to those on United States or Europe. In one such study, Majumdar (1997) found that older firms have lower return on sales ratios using a dataset of 1,020 Indian companies. However, a study by Ghafoorifard et al. (2014) provided evidence to the contrary. The authors analyzed the relationship between firm size, age and financial performance in 96 listed companies listed on Tehran Stock Exchange for the period from 2008 to 2011 and documented a positive relationship between a firm's age and its Tobin's Q ratio. A positive relationship between firm age and profitability was also documented by Kipesha (2013) for microfinance institutions in Tanzania and by Osunsan et al. (2015) for SMEs in Uganda.

A limited number of studies investigated age-profitability relationship for Turkish firms. These studies employed relatively small samples and short time periods. In one of them, Gurbuz et al. (2010) used panel data analysis on a sample of 164 firm-year observations for real sector firms for the period 2005-2008, and could not demonstrate a significant relationship between firm age and return on assets. Also relevant is the study by Basti et al. (2011) which employed panel data covering the period 2003-2006 from a sample of 160 listed firms in Turkey. Results from random effects model showed a positive relationship between age and profitability measures including return on assets, return on equity and basic earning power. On the contrary, Dogan (2013) found a negative relation between firm age and return on assets running a multiple regression on data from 200 listed companies between the years 2008-2011.

As is clear from the brief review of literature that precedes, both theoretical postulates and empirical evidence on firm age-performance relationship generated conflicting results which are highly dependent on the countries and periods under consideration as well as on the estimation methodologies employed. This suggests that further empirical evidence on the

issue is warranted, especially considering the limited number of studies conducted on Turkish firms.

3. Methodology

3. 1 Data and Variables

Data was collected on firms listed on Borsa Istanbul from January 2005 to December 2014. The reason for excluding the period before 2005 is due to the fact that the adoption of International Financial Reporting Standards (IFRS) for Turkish firms was made mandatory in that year. Hence, financial statements issued before 2005 would be incomparable. Firms operating in the financial sector including banks, investment firms or real estate investment trusts were excluded from the sample because of the different nature their financial statements.

Since the total number of firms in the sample is changing over the years (as a result of merger and acquisition activities, firms newly becoming public or firms which stop being listed on Borsa Istanbul) the data is unbalanced. The final sample consisted of 302 firms per year on the average and a total of 3,015 firm-years of observations. The minimum number of firms (234) was recorded in the year 2005 while the maximum number of firms (341) was achieved in 2013.

Given the objective of this study, which is to investigate the impact of firm age on profitability, three alternative measures will be used as dependent variables in our analysis. The first of these, return on assets (*ROA*) determines the ability of the firm to make use of its assets. It is calculated as the ratio of a firm's net income to its total assets. The second measure, return on equity (*ROE*) reveals how much profit is generated with the money shareholders have invested. It is calculated by dividing net income by total equity. The final indicator of profitability, gross margin (*GM*), represents the percentage of revenue retained after incurring the direct costs of providing goods or services and is calculated as the ratio of gross profit to total revenues. These dependent variables have been used for several researchers in their studies of Turkish firms (e.g. Basti et al. 2011, Dogan 2013, Gurbuz et al. 2010, or firms from other countries (e.g. Kipesha 2013, Loderer and Vaelchi 2010, Majumdar 1997).

Firm age will be measured in two different ways. First, we will define age as the number of years elapsed since the firm was first listed (plus one to avoid ages of zero). This measure, which we call listing age (*AGElist*) has been used by many studies in the previous literature (e.g. Chun et al. 2008, Fama and French 2004, Loderer and Waelchli 2010, Shumway 2001). In order to check the robustness of our empirical results, we follow Loderer and Waelchli (2010) and employ a second measure of firm age which we call incorporation age (*AGEinc*). This measure is defined as the number of years elapsed since the firm was first incorporated. The squared value of these measures will also be included as independent variables in our models because we hypothesize a non-linear relationship between firm age and profitability following Loderer and Waelchli (2010).

Following previous literature, we will also include the following control variables. First, we include leverage (*LEV*), measured by the ratio of total interest bearing debt to total assets. Liquidity (*LIQ*) is proxied by the ratio of current assets to current liabilities. The variable *R&D* refers to the research and development expenditures divided by net sales while the variable *SIZE* is defined as the natural logarithm of the firm's total assets. The final control variable, exports (*EXP*) is a dummy which takes the value of 1 for firms which derive some of their revenues from international sales and 0 otherwise. The average listing age for the firms in our

sample is approximately 12 years while the average incorporation age is approximately 31 years.

3. 2 Estimation

Six different versions of the following equation will be estimated, each using one of the three measures of profitability and one of the two measures of age introduced in the previous section.

$$Y_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 AGE_{it}^2 + \beta_3 X_{it} + \varepsilon_{it} \qquad \text{(Eq. 1)}$$

where:
Y_{it} is one of the financial performance measures (*ROA*, *ROE*, or *GM*) for firm *i* in year *t*,
AGE_{it} is one of the two age measures (*AGElist* or *AGEinc*) for firm *i* in year *t*,
X_{it} is the set of control variables (*LEV, LIQ, R&D, SIZE*, and *EXP*) for firm *i* in year t,
$\beta_0, \beta_1, \beta_2,$ and β_3 are vectors of parameters to be estimated,
ε_{it} is the error term.

Panel regressions are estimated in order to assess the relationship between firm age and profitability. To control for potential heteroscedasticity, robust standard errors developed by White (1980) are reported. To control for industry-specific effects, all variables except exports are introduced into the model as absolute deviations from the industry median. For this adjustment, industries are defined based on two-digit SIC codes. In cases where no industry benchmarks can be found, broader industry classifications provided by Campbell (1996) are used.

In order to control for the impact of the 2008 financial crisis, we include a dummy variable for the observations belonging to years 2008 and 2009. Before proceeding with analysis, multicollinearity is checked by ensuring that pairwise correlations among independent variables remain below 0.7. To reduce the impact of outliers, we follow Campbell et al. (2008) and winsorize all the variables at the 5th and 95th percentiles.

4. Results

Estimation results are provided on Table 1 that follows. In each of the six cases, the Hausman specification test points to a violation of the assumptions of the random effects model, therefore we prefer fixed effects. Regardless of the profitability and measures employed, the results show a negative relationship between firm age and profitability, meaning that older firms perform worse than younger ones. Except in the case when profitability is measured by the gross profit margin, the relationship between age and profitability is a convex one, as indicated by the positive coefficient of the squared age variable. These empirical findings suggest that firms tend to perform worse as they get older. This deterioration starts from the beginning of a firm's life, however, firms start to get more profitable again at old age.

Coming back to Table 1, the coefficients of the control variables show that firms employing more debt in their capital structure are less profitable. Firm size has a positive relationship with profitability, regardless of how it is measured. More liquid firms seem to perform better, except for the case when profitability is measured by the return on equity. A marginally significant positive relationship between exports and profitability is found only in the case where profitability is measured by return on assets. Finally, research and development expenditures do not have a significant relationship with profitability.

Table 1. Regression Results

	ROA (%)	ROE (%)	GM (%)	ROA (%)	ROE (%)	GM (%)
AGElist	-0.584***	-1.089***	-0.349**			
	(0.120)	(0.298)	(0.150)			
AGElist² / 100	1.614***	0.031***	0.165			
	(0.363)	(0.009)	(0.454)			
AGEinc				-0.535***	-0.897**	-0.253*
				(0.148)	(0.368)	(0.158)
AGEinc² / 100				0.643***	0.012**	-0.242
				(0.002)	(0.005)	(0.253)
LEV	-0.154***	-0.195***	-0.045***	-0.151***	-0.191***	-0.044***
	(0.012)	(0.031)	(0.015)	(0.012)	(0.031)	(0.015)
LIQ	0.180**	0.202	0.265**	0.190**	0.218	0.275**
	(0.086)	(0.215)	(0.108)	(0.086)	(0.215)	(0.108)
R&D	-1.020	-2.483	0.529	-1.011	-2.546	0.623
	(0.622)	(1.548)	(0.780)	(0.623)	(1.550)	(0.779)
SIZE	1.535***	1.806**	0.956**	1.395***	1.894**	0.890**
	(0.347)	(0.862)	(0.434)	(0.345)	(0.858)	(0.431)
EXP	1.022**	-0.497	-0.878	1.157**	-0.742	-0.925
	(0.498)	(1.239)	(0.624)	(0.498)	(1.239)	(0.623)
Crisis dummy	-0.785**	-2.162*	-0.389	-0.798**	-2.145**	-0.397
	(0.338)	(0.841)	(0.424)	(0.339)	(0.843)	(0.424)
Constant	-15.610**	-13.603	8.738	-7.627	1.699	13.553*
	(6.091)	(15.150)	(7.629)	(5.759)	(14.314)	(7.195)
R-squared	0.350	0.196	0.114	0.265	0.157	0.103
F-statistic	42.800***	16.090***	6.890***	41.410***	15.180***	7.010***
N	2828	2828	2828	2828	2828	2828
Hausman test	53.590***	44.020***	59.920***	113.78***	65.370***	80.630***

Standard errors in parentheses.

***,**, and * denote significance at 1%, 5%, and 10% respectively.

Source: Author's own calculations

5. Conclusion

The objective of this study was to investigate the relationship between firm age and profitability proxied by ROA, ROE and GM. The sample consisted of 302 listed companies per year on the average and the period of analysis covered the years between 2005 and 2014. Results from panel regressions with fixed effects and robust standard errors demonstrated that as firms get older, profitability declines. In addition, it has been shown that the relationship between age and profitability is generally a convex one. This suggests that younger firms start to see a decline in their profitability from the beginning but they may become profitable again at an old age.

The findings of this study are consistent with those obtained by Loderer and Waelchli (2010) and Majumdar (1997) but contradict several others including Coad et al. (2013), Ghafoorifard et al. (2014), Kipesha (2013) and Osunsan et al. (2015). For Turkey, our results are consistent with Dogan (2013) but contradict Basti et al. (2011). These contradictory results could be best explained by the specific features of the environment in which Turkish firms operate. In addition, it should be noted that prior studies using samples from Turkish firms covered relatively short time periods and used smaller samples than ours. Coming to the signs of

control variables, the positive impact of liquidity and firm size on profitability and the negative relationship between leverage and profitability are consistent with prior studies on Turkish firms (Akben-Selcuk 2016, Basti et al. 2011, Dogan 2013, Gurbuz et al. 2010).

Although this study offered some useful insight about the nature of the relationship between firm age and performance in a developing country like Turkey, it also suffers from a number of limitations. First, the explanatory power of the regression models was not very high because data constraints forced the author to consider a limited number of explanatory variables. Therefore, additional explanatory variables such as ownership measures or capital expenditures could be explored in future studies. Another suggestion for further research could be to conduct a comparative study on firms from other developing countries in order to increase the generalizability of the results. Future studies could also check the robustness of our empirical results by employing different methodologies, samples or time periods. A final avenue for further research could be to analyze the relationship between age and profitability at the business group level given the preponderance of such structures in Turkey.

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