THE INTERACTION BETWEEN FIRM GROWTH AND PROFITABILITY: EVIDENCE FROM TURKISH (LISTED) MANUFACTURING FIRMS

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Abstract

There is still not a consensus on 'which came first; the firm growth or the profitability'. According to some theoretical arguments, growth affects profitability and profitability supports growth. Because empirical evidence can not support the theoretical approaches considerably, this difference between the theoretical predictons and empirical evidences needs newly empirical evidence on Turkish manufacturing firms. Thus, this paper investigates interaction between firm growth and profitability using panel data on 137 Turkish listed manufacturing firms over the period 1997-2012. Using system-GMM (Blundell and Bond, 1998) growth and profit regressions are estimated. According to results there is a statistically significant positive relation between current profits and current growth. The impact of current profits on current growth is much stronger than the impact of current growth on current profits in the case of Turkish manufacturing firms. These results appear to contradict the theories in Industrial Organization which suggests a negative relationship. In addition, the results suggest that lagged profits affect current profits positively and lagged profitability is a significant determinant of current profits. Moreover, the link between current profits and lagged profits is much stronger than the link between current growth and current profits.

Keywords: Firm growth, profitability, system-GMM

FIRMA BÜYÜMESİ VE KARLILIK ARASINDAKI ETKİLEŞİM: (HALKA AÇIK) TÜRK İMALAT FİRMALARI ÜZERİNE BİR UYGULAMA

Özet

Firma büyümesinin mi yoksa karlılığın mı önce geldiği konusunda hala ortak bir yargı bulunmamaktadır. Bazı teorik görüşlere göre, büyüme karlılığı etkilemekte ve karlılık da büyümeyi desteklemektedir. Ampirik bulguların teorik yaklaşımları dikkate değer şekilde destekleyememesi nedeniyle, teorik çıkarımlarla ampirik bulgular arasındaki oluşan bu farklılık Türk imalat firmaları için de yeni bir ampirik bulguyu gerektirmektedir. Söz konusu kapsamda, 1997-2012 dönemine için halka açık 137 Türk imalat firmasından oluşan bir panel veri seti kullanılarak bu çalışmada firma büyümesi ve karlılık arasındaki etkileşim araştırılmaktadır. Sistem-GMM (Blundell and Bond, 1998) kullanılarak büyüme ve kar regresyonları tahmin edilmektedir. Elde edilen sonuçlara göre, cari karlar ile cari büyüme arasında istatistiksel olarak anlamlı pozitif bir ilişki bulunmaktadır. Türk imalat firmaları için cari karların cari büyüme üzerindeki etkisi, cari büyümenin cari karlar üzerindeki etkisinden daha güçlü olduğu görülmektedir. Bu sonuçlar, büyüme ile karlılık arasında negatif ilişkiyi destekleyen Endüstriyel Organizasyon teorisine ters düşmektedir. Bunun yanısıra, gecikmeli karların cari karları pozitif etkilediği ve gecikmeli karların cari karların önemli bir belirleyicisi olduğu sonucuna da varılmaktadır. Üstelik cari karlar ile gecikmeli karlar arasındaki bağlantının cari büyüme ve cari karlar arasındaki bağlantıdan daha güçlü olduğu görülmektedir.

Anahtar Kelimeler: Firma büyümesi, karlılık, sistem-GMM

Introduction

In the firm theory, economists assume that the companies sought to maximize profits. This is the behavioral assumption of neoclassical theory of firms located in the center. The firm is seen as just a black box. The goal of the representative firm is profit maximization in long-term. This goal can be realized by maximizing profits in each period, because of the decisions taken at a time will not affect the behavior of the firm in terms of other periods, in other words the periods are independent of each other. In the neoclassical approach in order to maximize profits, firms need to reach an optimum scale. The growth of firm means to capture this optimal scale and it is

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assumed that it can not grow any more beyond the optimal point. In this context, the neoclassical theory argues that large firms would be more profitable than smaller firms. In the Managerialism view, firm growth is based on the benefits are attributed to the size of firm by managers. According to Marris (1963), there is a strong relationship between a variety of resources of administrative positive benefits from the firm and size as the only observable parameter. According to Mueller (1969), when managers and shareholders have the same time preferences in terms of income expectations in small size firms, investment policies of growth-maximizing firms and profit-maximizing firms can coincide with each other. In the case of different time preferences, managers servicing to fulfill instructions for shareholders will have to make a choice between performing maximization profits and acting in for its own interest of growth maximization.

Mueller (1977) constructed the Persistence of Profits (POP) model by adopting a dynamic perspective. The theory states that if a firm has higher profits then its rivals, entry and exit are free until eliminating excess profits, and then in the long run profit rates in the market equals the marjinal firm's profit rate. On the other hand if some firms have special knowledge that enable them to be a monopoly until imitation or entry is realized, excess profits may persist over time, and differences in mean profit rates may be kept. In traditional strategy approaches such as in Porter's five forces model that is concentrated on external environment of the firms and most of them ignore the external factors of the firms. In contrast, the resource-based view (RBV) emphasizes the need for balancing between the external market environment and its internal capabilities. It focuses on the internal resources and capabilities of firms to reveal dynamics underline the profitability of the firm and its value. According to Penrose (1959), without understanding the own inner world of firm's, it does not make sense to analyze the external environment of firm.

An alternative view on the relationship between firm growth and profitability can be seen in evolutionary theory that the firms play a fundamental role at any time. Alchian (1950), with a classical paper on evolutionary theory, proposes a "natural selection" argument that fitter firms grow and survive, but less viable firms lose their market share and exit through the evolutionary selection mechanism. Thus, if profit rates reflect the degree of fitness, it is possible to predict that profitable firms will grow and maximize their profits. Alchian (1950) also emphasizes that this trend is not a result of firm decisions but rather a result of an evolutionary process being due to acting at an industry level. According to Nelson and Winter (1982) firms are striving to gain a competitive advantage through discovering cost-reducing innovations or imitation the best in the industry. As a result of this evalutionary view it is proposed that the most profitable firm will grow, less profitable ones lose their market share. Jovanovic (1982) in his theoretical paper, also pointed out profitable firms are being more likely to grow and survive by reinvestigating their earnings, otherwise inefficient firms are excluded from the market.

Many theoretical studies in the literature, relatively high-performing firms reinvest their profits to grow again, and thus it is emphasized that more efficient companies can catch higher growth rates. The empirical literature on the growth dynamics of firms initially points out Gibrat's Law (1931) that employs firms' growth and size as dependent and independent variables respectively. The importance of Gibrat's Law dwells in its ability to provide a better explanation for the empirical findings (Ijiri and Simon, 1977). Neoclassical economists ignored to explain why there were firms of heterogeneous sizes in the market. Gibrat's Law (Law of proportionate effect) states that a firm's growth is a random process and the firms operating in the same industry tend

to change the randomly distributed proportions of size. Thus the smallest firms have the same chance of growing as the industry's largest firms. Gibrat's Law is an alternative to neoclassical theory which informs that there is an equilibrium firm size to which all firms converge.

An alternative approach to growth and profit relationship, the 'passive learning model' of Jovanovic (1982) predicts that the annual growth rate of a firm depends on the accuracy at which managers are able to predict the prices of products. The profit of each firm depends on its efficiency level. If firms discover that they are efficient, they grow and survive. Otherwise if firms that obtain consistently negative information they decline and eventually leave the market (Bhattacharjee, 2005). Therefore, larger firms become more competent over time and there is less room for further improvement in these firms in terms of profitability and growth, leading to a random process for growth, especially among larger firms (Kiani et al., 2012). Geroski and Machin (1997) suggest that current period firm growth rates indicate changes in current expectations about the long run profitability of a firm. They imply that growth rates have possibilities to vary randomly over time. For large quoted U.K. firms over the period 1976-82, they submit that there is a statistically significant positive relationship between current period growth rates and changes in current expectations about long run profitability.

To examine the growth of small and medium-sized British firms in their study Robson and Bennett (2000) observe a positive relationship between both profitability and sales growth but also profitability and number of employees. However, only the sales growth case is considered to be as a statistically significant result. Cox et al. (2002) indicate the presence of a positive relation between sales growth rate and profit growth rate as a result of the imposed survey on 672 registered member of the Institute of the Entrepreneur of the Year. Liu and Hsu (2006) find a significant positive effect on the growth of the firm. Cowling (2004) shows that profit and growth have a tendency to act together for British firms. Hobarth (2006) shows that firms which with low book to market ratio, efficient working capital management, low liquidity, more equity and less liabilities, and high retained earnings have high profitability. Bottazzi et al. (2008) also investigate a sample of Italian manufacturing firms, and observe that the correlation between the profitability ratio and firm sales growth is positive but barely significant. Coad (2007) observes that while operating income has a positive and statistically significant effect on firm growth; it appears that the effect of firm growth on subsequent financial performance is larger. Guariglia (2009) states that while a higher level of profit is associated with higher rates of investment for firms have highly profit rates, low profit rates is associated with higher levels of investment for firms have the lowest level of profit rates. Niskanen and Niskanen (2007) suppose that in the case of the firms only which have less than 10 employees, there will be available a positive impact of increase in profit on firm growth. In an opposite manner, Coad (2010) states a negative relationship between growth and profitability based on his findings. Using sales growth and employment growth as an indicator for firm growth, Markman and Gartner (2002) examines their relationship with the profit growth. Accordingly, there is negative relationship between both firm growth measures and profitability. Similarly, Sexton, et al. (2000) show that a very weak relationship between sales growth and profits. Moreover, Bottazi *et al.* (2008) declare that there is not a remarkable relationship between growth trend and the differential profitability. Roper (1999) indicates that high profitability is not persistent above average growth rates for Irish companies and Gschwandtner (2005) argues that there is not a statistically significant relationships between firm growth and profitability for American companies. Capon et al. (1990) hava opposite finding to the view of growing more than their rivals become more profitable as a result. Investigating the impact of growth opportunities on profitability Serrasqueiro et al. (2007)

point out there is a nonlinear relationship between the two variables for 39 firms in the Portuguese Stock Market over the period 1999-2004. Their results imply that firms with low and high growth opportunities tend to catch an advantage for high profitability and the other firms have small profitability. In a later study by Serrasqueiro (2009) shows that the net effect of growth on profitability is positive and profitability is persistent. Asimakopoulos et al. (2009) perform on the determinants of firm profitability of non-financial Greek firms listed in Athens Exchange. Their findings show that firm profitability is positively affected by size, sales growth and investment and negatively by leverage and current assets. McDonald (1999) investigates the determinants of the profitability of Australian manufacturing firms by using a unique firm-level data set of firm performance over the period 1984-1993. The results suggest that lagged profitability is a significant determinant of current profit margins. Nakano and Kim (2011) investigate interaction between firm growth and profitability using a panel data on Japanese manufacturing firms over the period 1987-2007. They state that current profits are a prerequisite for future growth while excessive current growth has a negative impact on the future profits. Also Jang and Park (2011) provide evidence on the dynamic relationship between profitability and firm growth. They find for restaurant firms that the prior year's profitability has a positive effect on the growth rate of the current year. However, the current and prior year's growth rates have a negative effect on the current year's profitability. Their findings imply that in the restaurant industry profit creates growth but growth has a detrimental effect on profitability.

As seen above both theoretical and empirical literature try to find answers to these questions: Does growth bring profitability? Or because firms are profitable and reinvest their profits, they are able to growth? In this context, the main objective of this research is to explore the relationship between firm growth and profitability. Accordingly this paper uses a panel data on 137 Turkish listed manufacturing firms over the period 1997-2012. Growth and profit rate are observed annualy for this period, along with several control variables such as firm age, liquidity ratio and financial leverage. Using system-GMM (Blundell and Bond, 1998) growth and profit regressions are estimated.

The remainder of this research work is organized as follows. Part 2 describes variables and the data used. Part 3 explains the specification of the growth and profit regressions as well as the estimation method employed. Part 4 presents the empirical results. Finally, Part 5 offers concluding remarks based on estimation results.

1. Data and Variable Definitions

The data is compiled from balance sheets and annual financial statements of 137 manufacturing firms listed in Istanbul Stock Exchange-National 100 Index, from the year 1997 to 2012. Totally there are 191 firms listed in manufacturing sector, but to construct a balanced panel data and consider a long time span, 54 firms are excluded. In this paper sales growth believed to be closely related to the profitability is used as a measure of firm growth. Net sales growth is an obvious candidate for a variable that would determine a firm's profitability due to giving a more accurate picture of the real sales generated by the firm.

Table 1: Variables and their computation methods

Main Variables	*Computation method of the variables*
Profit Rate (PR)	Gross operating $profit_{(t)}$ / $Sales_{(t)}$
Growth Rate (SGR)	$logSales_{(t)} – logSales_{(t-1)}$ / $logSales_{(t-1)}$
Control Variables	*Computation method of the variables*

Leverage	(Short term debt + Long term debt)/Equity
Liquidity	Total Liabilities/Total Assets
Age	Logarithm of number of the years pass since the firm is found

Main variables and control variables with their calculations are presented in Table 1.

2. Model and Econometric Methodology

To describe the specification of the dynamic panel growth and profit models, the following dynamic panel equations are specified.

$$SGR_{i,t} = \varphi_1 + \beta\varphi_2 SGR_{i,t-1} + \varphi_3 PR_{i,t} + \eta_{1i} + \nu_{1i}\,; \quad i = 1, \dots, N, t = 1, \dots, T \tag{1a}$$

$$SGR_{i,t} = \varphi_1 + \beta\varphi_2 SGR_{i,t-1} + \varphi_3 PR_{i,t} + \varphi_4 PR_{i,t-1} + \eta_{1i} + \nu_{1i}\,; \quad i = 1, \dots, N, t = 1, \dots, T \tag{1b}$$

$$PR_{i,t} = \beta_1 + \beta_2 PR_{i,t-1} + \beta_3 SGR_{i,t} + \eta_{2i} + \nu_{2i}\,; \quad i = 1, \dots, N, t = 1, \dots, T \tag{2a}$$

$$PR_{i,t} = \beta_1 + \beta_2 PR_{i,t-1} + \beta_3 SGR_{i,t} + \beta_4 SGR_{i,t-1} + \eta_{2i} + \nu_{2i}\,; \quad i = 1, \dots, N, t = 1, \dots, T \tag{2b}$$

where i indicates the firm (i = 1, …, 27) and t indicates the time period (t = 1997, …2012). η_{1i} and η_{2i} represent firm-specific effects; ν_{2i} and ν_{2i} are random error terms. To account for additional related control variables, liquidity ratio, financial leverage and logarithm of age are included. The coefficients of these control variables are not estimated in the regressions, only used as exogenous instrumental variables.

Dynamic panel data estimation is more appropriate in cases where some unobservable factors affect both the dependent variable and the explanatory variables and some explanatory variables are strongly related to past values of the dependent variable. This is likely to be the case in regressions of profit on growth and growth on profit. Dynamic panel data model in these equations are proposed by Blundell and Bond (1998) and the extended version of the GMM estimator also known as system-GMM (sys-GMM). It is derived from the estimation of a system of two simultaneous equations: one in levels (with lagged first differences as instruments) and the other in first differences (with lagged levels as instruments). In presence of heteroscedasticity and serial correlation the two-step sys-GMM uses a consistent estimate of the weighting matrix taking the residuals from the one-step estimate (Davidson and MacKinnon, 2004). Though asymptotically more efficient, the two-step GMM carries out estimations of the standard errors that tend to be critically downward biased. However it is possible to overcome this problem using the finite-sample correction to the two-step covariance matrix developed by Windmeijer (2005) which can make two-step robust GMM estimates more efficient than one-step robust ones especially for sys-GMM (Roodman, 2009b). Another weakness of GMM estimations is too many instrument problems. There are various methods that are used to reduce instrument variable number. The first one is to use only certain lags instead of all available lags for instruments (limited lags). The second one, called as collapsing, is to combine instruments by adding them into smaller sets. Another way is to use the two techniques together (Roodman, 2009b). There are several reasons for preferring a dynamic sys-GMM panel model. First, static panel estimation omits dynamics causing dynamic panel estimation bias (Baum, 2006; Bond, 2002). Omitted dynamics means that such models are misspecified, because they pass over the impacts of lagged dependent variable as a right-hand-side variable on dependent variable (Bond, 2002). Second, the endogeneity problem which occurs when the independent variable is correlated with the error term in a regression model can be solved easier in dynamic panel data models than in the static models. Third, in multivariable dynamic panel models the sys-GMM estimator is known to

perform better than the differenced-GMM (DIF-GMM) proposed by Arellano and Bond (1991). The sys-GMM estimation is more appropriate when variables are "random walk" or close to be random walk variables (Bond, 2002; Roodman, 2009a, 2009b) because DIF-GMM estimator can suffer from a weak instruments problem in that case (Sarafidis et al., 2009).

3. Empirical Results

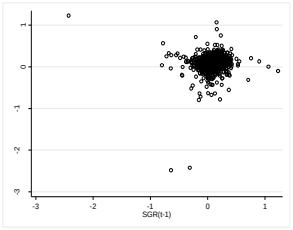
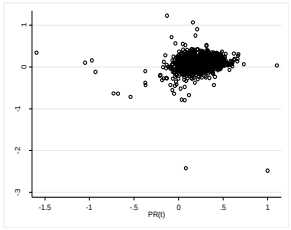
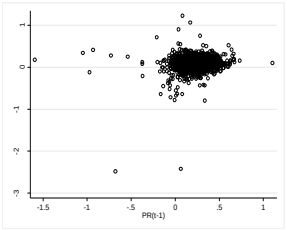
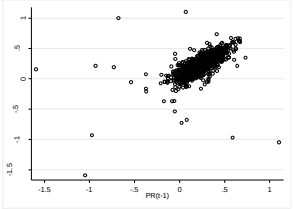
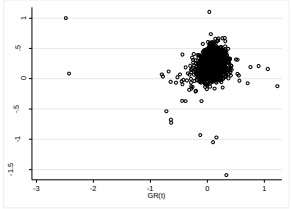
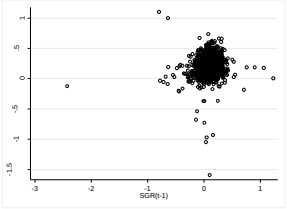
Table 2 shows the descriptive statistics of main and control variables. The avarage profit rate of the listed Turkish manufacturing firms is greater than avarage sales growth rate. Thus, these firms have a high profit rates but a low growth rate. The avarage age indicates that these firms are relatively younger.

Table 2: Descriptive statistics

Variable	SGR	PR	Age	Leverage	Liquidity
Mean	0.0871	0.2303	34.77	54.7653	1.2964
Std. Dev.	0.1592	0.1511	12.29	12.2955	58.8736
Obs.	2052	2189	2192	2192	2192

Before estimation of a parametric model, as in Coad (2007), scatter plots are used to provide a visual representation of the underlying relationship between growth rate and prior year's profit rate or between profit rate and prior year's growth rate. Table 3 shows these relationships as scatter plots.

Table 3: Scatter plots of growth and profit rates using one year lag

Y axis: *SGR(t)* X axis: SGR(t-1)	Y axis: *SGR(t)* X axis: PR(t)	Y axis: *SGR(t)* X axis: PR(t-1)
		
Y axis: *PR(t)* X axis: PR(t-1)	Y axis: *PR(t)* X axis: SGR(t)	Y axis: *PR(t)* X axis: SGR(t-1)
		

The first row of Table 3 represents SGR_t and subsequent profit rates. The second row of Table 3 represents PR_t and prior year's growth rates. It is seen clearly that based on the plot for profit rate time *t* and *t-1*, current and prior year's profit rates are positively correlated. All other plots seem to indicate no relationship and have a cloud shape but are a little scattered horizontally especially first row plots. However, these scatter plots show only there is a relationship between variables or not. They do not give information about directions of causality.

To explore the directions of effects, Eqs.(1a, 1b) and Eqs.(2a, 2b) are estimated using sys-GMM estimators. Table 4 and Table 5 are represents estimation results of these regressions. As for firm growth bivariate regression includes only lagged growth and current profit. Meanwhile,

multivariate regression includes lagged growth, current profit and lagged profit. On the other side, profit bivariate regression includes only lagged profit and current growth; multivariate regression contains lagged profit, current growth and lagged growth.

Table 4: Two step sys-GMM estimation results of GROWTH regressions

	Model 1a	**Model 1b**
Dependent Variable: SGR_t		
SGR_{t-1}	-0.0265 (-0.46)	0. 0201 (0.30)
PR_t	0.0847** (2.37)	0.7401*** (5.22)
PR_{t-1}		-0.1694 (-1.44)
AR(1) (*p*-value)	(0.006)	(0.006)
AR(2) (*p*-value)	(0.270)	(0.688)
Hansen J-test (*p*-value)	(0.257)	(0.257)
Difference Hansen tests (*p*-value)		
All sys-GMM instruments	(0.963)	(0.243)
Those based on lagged SGR *only*	(0.494)	(0.438)
Instruments	29	23
Observations	1915	1915

Note: Robust *t-statistics* are reported in parentheses of estimated coefficients. The estimated coefficients of time dummies are not reported here in order to save space. GMM type variables are SGR_{t-1} and PR_t and their lags range is set to from two to six in all models. Following the suggestions of Roodman (2007), the standard type instrumental variables are *logarithm of age, leverage, liquidity* and *time dummies*. *Hansen J-test* is a test for over identification restrictions. *p-values* for these tests are shown in parentheses.
**p*<0.10. ***p*<0.05 and ****p*<0.01

In Table 4, according to Model 1a and Model 1b, there is no statisticially significiant relationship between SGR and SGR_{t-1} and also between SGR and PR_{t-1}. The bivariate growth regression indicates that current profit has a little impact on current growth. However, when the lagged profit is taken, current profit has a strong positive effect on firm growth in the multivariate growth regression.

Table 5 reports the estimation results for the profit regressions. The bivariate profit regression implies that profits persist and current growth supports profitability for the listed Turkish manufacturing firms. POP states that if a firm has higher profits then its rivals, entry and exit are free until eliminating excess profits, and then in the long run profit rates in the market equals the marjinal firm's profit rate. On the other hand according to Mueller (1977) if some firms have special knowledge that enable them to be a monopoly until imitation or entry is realized, excess profits may persist over time, and differences in mean profit rates may be kept.

Table 5: Two step sys-GMM estimation results of PROFIT regressions

	Model 2a	**Model 2b**
Dependent Variable: PR_t		
PR_{t-1}	0.6888*** (9.99)	0. 6139*** (7.87)
SGR_t	0.3619** (2.70)	0.3820** (2.32)
SGR_{t-1}		0.1011 (0.89)
AR(1) (*p*-value)	(0.008)	(0.002)
AR(2) (*p*-value)	(0.319)	(0.252)
Hansen J-test (*p*-value)	(0.516)	(0.603)
Difference Hansen tests (*p*-value)		
All sys-GMM instruments	(0.384)	(0.588)
Those based on lagged PR *only*	(0.245)	(0.387)
Instruments	27	27
Observations	1915	1915

Note: Robust *t-statistics* are reported in parentheses of estimated coefficients. The estimated coefficients of time dummies are not reported here in order to save space. GMM type variables are SGR_{t-1} and PR_t and their lags range is set to from two to six in all models. Following the suggestions of Roodman (2007), the standard type instrumental variables are *logarithm of age, leverage, liquidity* and *time dummies*. *Hansen J-test* is a test for over identification restrictions. *p-values* for these tests are shown in parentheses.
**p*<0.10. ***p*<0.05 and ****p*<0.01

Comparing growth and profit regressions clearly show that the impact of current profits on current growth is much stronger than the impact of current growth on current profits in the case of Turkish manufacturing firms. In addition, the results suggest that lagged profits affect current profits positively and lagged profitability is a significant determinant of current profits. Moreover, the link between current profits and lagged profits is much stronger than the link between current growth and current profits.

Conclusions

Profitability and growth are the key variables in economic analysis, not only as an evidence of a firm's productivity, but also as a foundation of the economic accumulation process and therefore an important subject of articulation in economic analysis. Even though well-established theoretical perspectives favor a positive relationship between business growth and profitability, empirical evidence is not only limited but also contradictory. Additionally, the direction of the causality between both variables remains unclear defined. In the light of these shortcomings in this specific issue, in this paper the interaction between firm growth and profitability for the listed Turkish manufacturing firms is explored over the period 1977-2012. Dynamic panel data estimation methods are employed to estimate growth and profit regressions to capture direction of the causality between firm growth and profitability.

The estimation results from the growth regressions confirm the positive relationship between current profit and current growth. There is no statistically significiant relationship between prior year's profits and current growth. The results are able to find causal relationship going from profitability to growth, supporting some of the most well established theoretical frameworks, such as the evolutionary model in economics or the RBV within the management literature. The results from the profit regressions show that firm growth has positive effects on profits. This appears to contradict the theories in Industrial Organization which suggests a negative relationship. The evidence presented here may contribute to a more critical appraisal of the so-called 'ideology of growth' which characterizes some part of the firm growth literature, assuming

that firm growth is always beneficial and a proxy of firm success (Davidsson et al., 2009). Actually, this paper finds a positive effect of growth on profitability. However, some limitations of this paper should be commented. In particular, the dataset used in this analysis are not sufficient to generalize the results over the all Turkish manufacturing sector. Different profit ratios and growth variables may be used to confirm these findings.

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