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# Ownership Structure, Information Asymmetry and Growth of the Firm: Implications from Non-Financial Firms Listed in S&P500

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## Abstract

This paper investigates the association between firms' growth and ownership structure under conditions of information asymmetry. The objective is to show the effects of information asymmetry (favorable versus adverse selection) on the choice of the ownership structure that helps firms grow. Our sample includes non-financial firms listed in the S&P500 over the period 2000 to 2016. The dependent variable is growth of the firm measured by growth in sales. The independent variables are proxies for changes in ownership structure, individual investors, investment managers, and brokerage firms. Observations are grouped according to level of information asymmetry (high or low) using three proxies for information asymmetry: Beta ROE, Probability of Default of ROE, and the *q* ratio. The results conclude that (a) changes in ownership structure affect growth of the firm positively; (b) the effect of ownership structure is more significant and consistent at low level of information asymmetry. Hence, the contribution of the paper is threefold. First, it extends the arguments of corporate governance by showing the impact of ownership structure on growth of the firm. Second, it offers robust evidence that growth of the firm is associated with low level of information asymmetry. Third, we show that fundamental financial information can help lessen the level of information asymmetry, thus help firms grow.

JEL classification: D82, D22

Key Words: Ownership structure, information asymmetry, growth of the firm, S&P500

## 1. Introduction

The presence of information asymmetry in financial decisions raises the question of how firms communicate potential growth with financing providers. Firms' progressive growth rates offer evidence that management has been able to make successful cointegrated decisions such as raising appropriate capital from relevant sources (internal and/or external) in order to finance profitable investment opportunities. The opposite is also true. Information asymmetry between firms' management and financing providers may also hinder any of the cointegrated decisions. It is highly likely that the presence of information asymmetry leads to irrational decision-making given that managers do not have complete or enough information. The pioneering work of Myers and Majluf (1984) assumes rational financial decisions. The present paper argues that rationality is less likely to happen under conditions of high information asymmetry. The latter may lead to imperfect information that decision makers would favor a source of financing over others (Bhattacharya, 1979). Therefore, the inevitability of information asymmetry may lead firms' management to change the ownership structure in order to mitigate the adverse effects on growth of the firm.

The growth of the firm is quite interrelated with information asymmetry intrinsically (Eldomiaty et al., 2018). It is uncertain at any point in time and usually measured at the end of a financial (or accounting) horizon. Hence, as both the near- and the far-future are uncertain, the growth of the firm remains uncertain as well. Firms, to a large extent, can't be certain about market reaction in advance. Prediction errors exist at all time. The reaction of finance providers, customers, suppliers and other stakeholders can't be certain unless contractual agreements exist in place. Nevertheless, contractual incompleteness (Hart, 1988; Hansmann, 1986, 1988; Williamson, 1985, 1986; Hart and Moore, 1999; Tirole, 1999; Sigal, 1999; Aghion and Holden, 2011; Hart, 2017) leaves space for information asymmetry. In this paper, we argue that

information asymmetry must be treated as a condition of growth of the firm with high levels of information asymmetry been detrimental to the growth of the firm. In this sense, the current paper empirically examines how firms grow, and actually, could have grown, in an environment surrounded by many forms of information asymmetry.

Ownership structure has been considered a governing tool in the literature of corporate governance. That is, firms' management can use ownership structure to manage the relationships with finance providers. The literature on corporate governance and ownership structure include many studies showing that firms' growth is affected by financial and non-financial factors. Nevertheless, most of the literature focuses on the impact of financial rather than non-financial decisions (Fama and French, 2002). Less attention is given to non-financial variables such as industry effects, ownership structure and size. This study examines the impact of ownership structure on growth of the firm at high and low levels of information asymmetry controlling for industry type and size. Al-Najjar (2015) provides inconclusive evidence on the impact of institutional ownership on firms' performance in contradiction to the wide results that ownership structure can play an important role in reducing information asymmetry (Fazlzadeh et al., 2011; Judge, 2010). Hence, the conflicting findings on the role of ownership in reducing information asymmetry provide our research motivation.

As ownership structure is the focal point in this paper, we raise two questions. The first question is about the relevant proxies for information asymmetry that fit the concerns and interest of various forms of ownership examined in this paper, namely, individual investment, brokerage firm ownership and investment firms' ownership. In this case, we extend three proxies for information asymmetry that are recently proposed by Eldomiaty et al. (2019). The second question is about the elements of ownership structure that influence growth of the firm in cases of heterogeneous information asymmetry. To provide an answer to those

questions we examine the effects of individual investment, brokerage firm ownership and investment managers' ownership on growth of the firm under conditions of low and high information asymmetry.

This paper makes two main contributions. First, it examines the role of a non-financial factor (ownership structure) on firms' growth. This is in stark contrast to prior studies that predominately utilise financial factors (Myers and Majluf, 1984; Bhattacharya, S., 1979; Bayless and Diltz, 1991; Campbell, 1979; Daniel and Titman, 1995; Giammarino and Neave, 1982; Leland and Pyle, 1977). Second, it examines the effects of three different proxies for information asymmetry in order to provide robust evidence of the effects of ownership structure on firms' growth. This is done to account for the lack of consensus on the proxies for information asymmetry currently in the literature (Eldomiaty et al., 2019).This argument also extends the view that a firm is influenced by a nexus of relationships that help it to grow (Bratton, 1989; Eisenberg, 1999; McGaughey, 2015).

The rest of the paper is organised as follows. Section two reviews the studies that examine the relationship between ownership structure and firm characteristics. The third section discusses our theoretical framework and presents our testable hypotheses. Section four describes our variables, statistical tests and estimation methods; while section five reports and discusses the results. The last section concludes.

## 2. Ownership Structure and Firm Characteristics

The assertions of Brush et al. (2000) that ownership matters to the relationship between financial decisions and growth of the firm offer an extended research avenue for set of

determinants of firm growth such as ownership structure, board composition, internal audit unit and committees of both executives and non-executives that are employed to enhance firm performance and reduce the informational gap between managers and shareholders (Fazlzadeh et al., 2011; Judge, 2010; Aguilera et al., 2008).

Al-Najjar (2015) argues that the review of literature for the impact of institutional ownership on the firm's performance shows no consensus and delivers strong debate on the topic including various studies across developed and developing countries. Regarding the impact of institutional investors versus individual investors on firm performance, Grossman and Hart (1980) show that institutional investors, such as investment managers, insurance firms, and brokerage firms, possess more knowledge, skills and capital than individual investors. Institutional investors have strong incentives and motivation to monitor the behavior of managers, therefore, they must have an influence on corporate governance. Other studies have examined the impact and scope of this effect on firm performance. Shleifer and Vishny (1986) claim there is a greater incentive for institutional shareholders to monitor managers' behavior than board members who possess little or no shares in the firm. In addition, Cornett et al. (2007), McConnell and Servaes (1990), Nesbitt (1994), Smith (1996) and Del Guercio and Hawkins (1999) report consistent results that corporate monitoring by institutional investors result in managers focusing more on corporate performance and less on opportunistic or self-serving behavior. These results confirm that institutional shareholders have a direct impact on firm performance.

Other studies favor an opposite view suggesting that not all institutional shareholders hold huge amount of shares in firms and care about the long-term survival of the firm (Bhide, 1994; Demirag, 1998; Maug, 1998). In fact, many institutional shareholders care more for liquidity of their shareholdings and short-term profitability rather than spending money, time

and effort on monitoring. They are reluctant to spend significant amounts on monitoring while other shareholders enjoy "a free ride."

Despite the mixed evidence on the impact of institutional shareholders on corporate governance and monitoring schemes, the empirical evidence suggests that ownership structure can sometimes affect the performance of the firm. That is, McConnell and Servaes (1990), Del Guercio and Hawkins (1999), Cornett et al. (2007), and Chen et al. (2008) report a positive relation between the percentage of institutional ownership and various performance measures. This finding is consistent with other studies in different countries and across different time horizons such as Manawaduge and De Zoysa (2013) in Sri-Lanka and Thomsen and Pedersen (2000) in European countries. However, Agrawal and Knoeber (1996), Faccio and Lasfer (2000) and Fazlzadeh et al., (2011) have found an insignificant impact. These mixed empirical results are consistent with the assertions made by Al-Najjar (2015) that no certain conclusion can be drawn about the effect of institutional ownership on the performance of the firm.

More recent studies integrate various governance variables such as ownership structure, board composition and independence together into a ranking system in order to offer better understanding to the impact of corporate governance mechanisms on firm performance (Aguilera et al., 2008; Judge, 2010), yet using these complex measures rather than individual measures resulted in contradictory and ambiguous results (Bhagat et al., 2008). To the best of the authors' knowledge, none of the previously-mentioned studies examines the effect of ownership structure on growth of the firm taking into consideration various levels of information asymmetry. The only close study is Thomsen and Pedersen (2000) that uses sales growth as a proxy for firm performance. This study reports that firms whose largest shareholder is a family or another firm have higher growth of sales. Hence, prior research reports mixed

results regarding the impact of institutional ownership, or ownership structure in general, on growth of the firm.

## 3. Hypotheses Development

It is plausible to assume that institutional investors like mutual funds, investment managers and brokerage firms (given they own shares rather than play their initial role as an intermediary in the secondary market) typically possess substantial amount of shares, thus are better able to monitor the performance of managers. This monitoring encourages managers to focus on the performance of the firm rather than on personal benefits. The empirical evidence in the literature suggest either a positive impact or no effect of institutional investors on firm performance. The better performance shall enable these firms to grow in terms of sales, assets, etc. For example, Faccio and Lasfer (2000), Fazlzadeh et al. (2011) and Al-Najjar (2015) suggest that mixed results were obtained regarding the impact of institutional investors on firm performance. Whereas, McConnell and Servaes (1990), Del Guercio and Hawkins (1999), Cornett et al. (2007) and Chen et al. (2008) report a positive relation between the percentage of institutional ownership and various firm performance measures. These results suggest that institutional investors might contribute to the growth of the firm. In particular, firms that face high level of information asymmetry might rely on monitoring by institutional shareholders. Thus, high institutional ownership concentration could contribute to the performance and growth of the firm. Therefore, in case of firms that face high level of information asymmetry, a testable hypothesis could be derived as follows.

*H1: "A positive relationship exists between institutional ownership concentration and firm growth at high level of information asymmetry."*

Nevertheless, individual investors, though might have knowledge and experience, might have less access to information about the firm than institutional investors. Barber and Odean (2000) argue that individual investors are typically less informed, and their average annual returns are substantially less than the average market return. They conclude that individuals are advised not to invest on their own as this may affect their personal wealth. Moreover, Shleifer and Vishny (1997) claim that ownership concentration could serve as a substitute to weak protection rights of investors. Since individual investors are typically the less protected and less informed investors, they will normally increase their ownership portion only in firms where they have access to enough information upon which they can take their decision on whether to invest. Typically, shareholders will select successful firms that are expected to perform better in the future in terms of profitability, growth etc. Therefore, another testable hypothesis is as follows.

*H2: "A positive relationship exists between an increase in individual ownership concentration and growth of the firm at low level of information asymmetry."*

## 4. Data, variables and statistical estimation

The sample firms include the non-financial firms listed in S&P500. Annual ownership data for the period from 2004-2014 are obtained from Thomson Reuters database (Eikon). Ownership structure is divided into three items: individual investors, investment managers and brokerage firms. The latter two variables correspond to institutional investors' ownership whereas the first variable corresponds to individuals' ownership. The dependent variable is the change in sales growth (*SG*) which is considered a proxy for the growth of the firm. The independent variables are: change in individual investments, change in brokerage firms' ownership and change in

investment managers' ownership. Brokerage firms typically play the role of financial intermediary in the secondary market yet sometimes brokerage firms hold shares in some firms as a form of investment. Furthermore, we also introduce control variables for industry and size effects. The size dummy is measured using the value of total assets.

This paper examines the effects of information asymmetry using three proxies that are just recently introduced in the related literature (Eldomiaty et al., 2019). These are (i) beta ROE, (ii) PD ROE and the (iii) *q* ratio. The first proxy measures the sensitivity of stock returns to the expected ROE. In this case, beta algorithm can be utilised operationally. The negative beta refers to adverse selection and positive beta refers to favorable selection. This proxy is in line with prior studies in the field such as Krishnaswami and Subramaniam (1999), Christie (1987) and Dierkens (1991). The rationale for this proxy is that positive betas indicate that the investors can expect the firm's ROE and the stock prices are associated with those changes in ROE to be positively related. The negative betas indicate that the investors' reaction, in terms of stock price changes, goes against the expected ROE which is viewed as an adverse selection.

The second proxy measures the probability of adverse selection using the Black-Scholes option pricing model, where the probability of occurrence $N(d_2)$ is the cumulative standard normal density function. The $N(d_2) = 0$ refers to favorable selection, while $N(d_2) \geq 0$ refers to adverse selection, thus the existence of agency problems. Black and Scholes (1972, 1973) option pricing model offers a stochastic method for calculating the expected value of an option when the inputs (current stock price and strike price) are also expected as well. The standard linear stochastic Black-Scholes model is algebraically estimated as follows:

$$(1) Call\ Price = S \times N(d_1) - X \times e^{R_f \times (T-1)} \times N(d_2)$$

$$(2) d_1 = \frac{ln\left(\frac{S}{X}\right) + \left(R_f + 0.5\sigma^2\right) \times (T-t)}{\sigma \times \sqrt{T-t}}$$

$$(3)\ d_2 = d_1 - \sigma \times \sqrt{T-t}$$

where, $S$ = current stock price, $X$ = strike price, $(T\text{-}t)$ = time to maturity, $R_f$ = risk-free rate of interest and $N(.)$ is the cumulative standard normal density function.

The rationale of using Black-Scholes model in the context of this paper is that the expected stock returns and ROE are subject to stochastic processes. Therefore, the option pricing model can be adapted as follows:

$$(4)\text{Intrinsic Return} = E(\text{ROE}_t) \times N(d_1) - R_t \times e^{R_f \times (T-t)} \times N(d_2)$$

This equation shows that the information asymmetry between financial managers and the investors creates a disconnection between stock returns and firm's profitability. The former might be far higher or lower than the latter. In this case, the favorable selection of a stock occurs when the stock return equal or less than firm's expected profitability. Since investors are expecting future price, the stock return is associated with a probability of occurrence. Therefore, the probability of default is (PD) = 1- $E(\text{ROE}_t)$. In this case, the PD is associated with an adverse selection. The probability of occurrence $N(d_2)$ is a cumulative standard normal density function calculated as follows:

$$(5) d_2 = \frac{\frac{E(ROE_t) - R_t}{R_t} + \left(R_f - 0.5\sigma^2\right) \times (T-t)}{\sigma \times \sqrt{T-t}}$$

where, all terms have been explained above.

These equations offer two advantages. Firstly, they allow for price correction when the stock return goes higher or lower than the firm's profitability. The second advantage is that they guarantee the investors an expected return $E(\mathrm{ROE}_t)$ when prices do not change (*return* = 0).

Our third proxy is the *q* ratio which can be either higher or lower than 1. The lower the *q* ratio, the most severe the information asymmetry problem between management and market participants is. This is mainly due to under-investment behavior of management (Koch and Shenoy, 1999: Stein, 2003). The calculation of *q* ratios in this paper follows the simple approximation of Tobin's *q* introduced by Chung and Pruitt (1994)[1] calculated as follows:

$$Chung - Pruitt\ q = \frac{MV(CS)+BV(PS)+BV(LTD)+BV(INV)+BV(CL)-BV(CA)}{BV(TA)} \quad (6)$$

where *MV(CS)* is the market value of common stock; *BV(PS)* is the book value of preferred stock; *BV(LTD)* is the book value of long-term debt; *BV(INV)* is the book value of inventory; *BV(CL)* is the book value of current liabilities; *BV(CA)* is the book value of current assets, and *BV(TA)* is the book value of total assets. Table 1 describes the variables while Table 2 reports the descriptive statistics of the variables used in the analysis.

*[Insert Tables 1 and 2 about here]*

*Statistical Tests and Estimation Methods*

The heterogeneity of information asymmetry requires a classification of each proxy into low

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[1] In their paper, the authors used widely available balance sheet items to calculate a simplified version of *q* ratios and empirically compared it against values calculated using the most sophisticated approach from Lindenberg and Ross (1981). Their results show that their most simplified version explains *at least* 96.6% of the variability of Tobin's *q*.

(1st quartile) and high (4th quartile) levels. In this case, we carry out a Goldfeld-Quandt test to examine the extent to which the two levels of information asymmetries are statistically different from each other, thus heterogeneity exists. (Goldfeld and Quandt, 1965; Thursby, 1982). The test runs under the hypotheses that:

$$H_0 : \sigma_1^2 = \sigma_2^2 \text{ (heteroskedasticity does not exist)}$$
$$H_1 : \sigma_1^2 \succ \sigma_2^2 \text{ (heteroskedasticity exists)}$$

*[Insert Table 3 about here]*

The results reported in Table 3 show that the two levels (low-high) of information asymmetry differ statistically at 5% significant level. These results provide enough condition to examine the extent to which different levels of information asymmetries affect growth of the firm. In terms of agency theory, low level of information asymmetry is treated as a proxy for favorable selection, while high level of information asymmetry is treated as a proxy for adverse selection.

In terms of data analysis, four econometric issues are examined, namely; the normality versus non-normality, the linearity versus nonlinearity, fixed versus random effects estimation and endogeneity. We use an Anderson-Darling test (1952, 1954) for the examination of the normality of the data. The results indicate that all dependent and independent variables are not normally distributed as the p-value is less than 5% (the results are shown in Appendix A). Therefore, the variables are converted into normal scores using the Van der Waerden method (Waerden, 1927, 1930, 1931). In addition, multicollinearity is tested using the Variance Inflation Factor (VIF). The variables are associated with VIF of less than 5. As for the fixed versus random effects, Hausman specification test is used to identify whether fixed or random effects model should be used (Hausman, 1978; Hausman and Taylor, 1981). The results of the test show that the random model fits the distribution of the data. Therefore, we utilise a

Lagrange Multiplier to standardize the variances across firms for the dependent and independent variables (Briand and Carter, 2011).

The issue of linearity versus nonlinearity is addressed using the Regression Equation Specification Error Test, RESET (Ramsey, 1969; Thursby and Schmidt, 1977; Thursby, 1979; Sapra, 2005). The results of the F test ($\alpha$ = 1%) show that the F statistic is greater than the critical value leading to the rejection of the null hypothesis; hence, a nonlinear model is appropriate[2] and the variables are raised to the power of three to fit a linear model. Finally, the Hausman specification test (Hausman, 1978) is used to check for endogeneity of variables to measure the effects of a two-way relationship between dependent and independent variables. This step is performed by comparing the estimates of the instrumental values with those of ordinary least squares. The results show that the three ownership variables are exogenous. Therefore, an Ordinary Least Square (OLS) method is appropriate for examining the contribution of changes in ownership structure to growth of the firm under high and low levels of information asymmetry.

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[2] $F-\text{statistic} = \frac{(SSE_R - SSE_U) \div J}{SSE_U \div (T-K)}$, where $SSE_R$ and $SSE_U$ are the sum squared errors for the restricted and unrestricted models respectively, *J* refers to the two hypotheses under consideration, *T* is the number of observations, and *K* is the number of regressors.

## 5. Results and Discussion

Table 4 reports the results of the regression analysis being classified into favorable and adverse models. The favorable selection is a proxy for low level of information asymmetry. The adverse selection is a proxy for high level of information asymmetry.

The results reported in Table 4 offer support to the developed hypotheses especially for individual investors' ownership concentration. The latter is positively significant in the three favorable models (where firms face low level of information asymmetry). However, less support is given to the hypothesis related to institutional ownership concentration. That is, investment managers' ownership is significant in one model and brokerage firms' ownership significant in two models. Yet, none of the findings contradict the stated hypotheses.

The results in Table 4 also show the contribution of changes in ownership structure to sales growth at high and low levels of information asymmetry. The results of the favorable models are very consistent using all three proxies for information asymmetry whereas the adverse models show less consistency. In all models, the increase in ownership concentration - either individual or institutional - contributes positively to firms' growth. For example, brokerage firms' ownership and individual investments are both positively related to sales growth, results that are significant at the 1% percent level for all three models. The finding that institutional ownership has a positive impact on growth of the firm is consistent with theories in prior literature suggesting that institutions help monitor managers' behavior; hence, contributing to operating performance, i.e. McConnell and Servaes (1990), Del Guercio and Hawkins (1999), Cornett et al. (2007) and Chen et al. (2008). As for individual investments, the finding that they have a positive impact on firm growth supports the notion that ownership concentration leads to better performance as suggested by Manawaduge and De Zoysa (2013).

Nevertheless, the insignificant coefficient for investment managers is consistent with other studies that suggest an insignificance relationship between ownership structure and corporate performance such as those of Agrawal and Knoeber (1996), Faccio and Lasfer (2000) and Fazlzadeh et al. (2011). This result is justified by the fact that investment managers are reluctant to interfere in corporate governance and focus more on short-term benefits such as capital gains and dividend payments as suggested by Bhide (1994), Demirag (1998) and Maug (1998).

The aforementioned results vary across industries. The relationship between investment managers and growth of the firm is significant for most of the industries in at least one of the three models except for two industries; material and consumer discretionary (IND 6 and 8). In addition, the firms' size has a significant effect as the above results vary across different levels of size whether measured by total assets or by market value of equity. This finding shows that, regardless of size of the firm, most firms target growth of sales including large ones. The adjusted R-square ranges from 9% to 15% in the three models giving insight on the relative contribution of changes in ownership structure to growth of the firm when the firm is facing low level of information asymmetry.

In case of high level of information asymmetry (adverse models), the results of the Beta ROE model are different to those from the other two models. In the Beta ROE model, the coefficient of investment managers' ownership is positive and statistically significant, while those for brokerage firms and individual investments are all insignificant. These results indicate that individual investors are repelled from firms that suffer from high level of information asymmetry and even brokerage firms prefer not to get involved with such firms as suggested by Bhide (1994), Demirag (1998) and Maug (1998). The positive and significant coefficients of brokerage firms and individual investment are consistent with the favorable models. These results offer supporting evidence to the role of institutional investments in monitoring the

performance of corporate managers. They also suggest that individual investors prefer not to invest in firms that suffer from a high level of information asymmetry. As for the industry and size effects, the relationship is significant for most of the industries in at least one of the three models except for two industries, utilities and materials (IND 5 and 6), whereas size is significant in all three models. The adjusted R-square ranged from 6%-25%, which shows various impacts of ownership concentration on firms facing high level of information asymmetry.

Overall, the results are consistent with recent findings by Al-Najjar (2015) that ownership structure and concentration produce mixed results with regards to their link with firms' performance. We further add to this argument by showing that favorable models report a significantly positive impact of individual investments as compared to the adverse models. Moreover, institutional investments have a significant positive impact on firm growth and this impact is more stable for firms facing low level of information asymmetry. Finally, the findings of this study are consistent with previous findings (McConnell and Servaes, 1990; Nesbitt, 1994; Smith, 1996; Del Guercio and Hawkins, 1999; Cornett et al., 2007; Manawaduge and De Zoysa, 2013) that ownership structure and concentration can, in fact, affect firms' performance.

## 6. Conclusion

This paper reports a significant contribution of changes in ownership structure to growth of the firm at high and low levels of information asymmetry. In terms of information asymmetry, favorable selection models appear to be more consistent in terms of economic and statistical significance. Thus, the results show that there is a significant impact of the changes of ownership structure to firms' growth in the presence of low information asymmetry (favorable

selection). We also offer clear evidence that stochastic measures of accounting return on equity and Tobin's *q* ratio can be confidently used as proxies for information asymmetry. The paper extends the contributes of other related studies in the literature that growth of the firm requires corporate managers to use fundamental financial information to lessen information asymmetry between firms and institutional as well as individual investors.

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# Appendix A

Figure (1): Anderson-Darling test for the Normality of Sales Growth

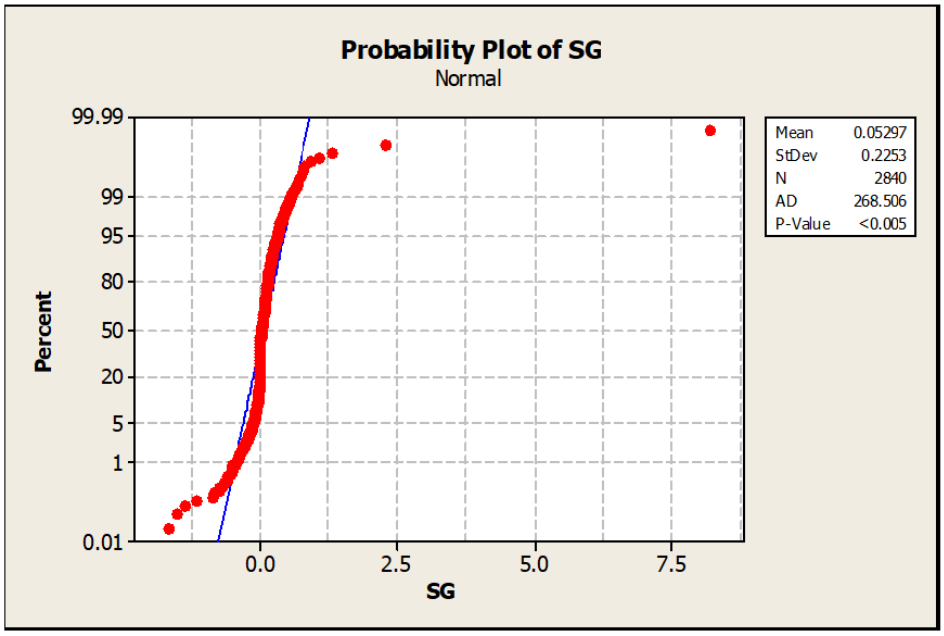


Figure (2): Anderson-Darling test for the Normality of Ownership by Investment Managers

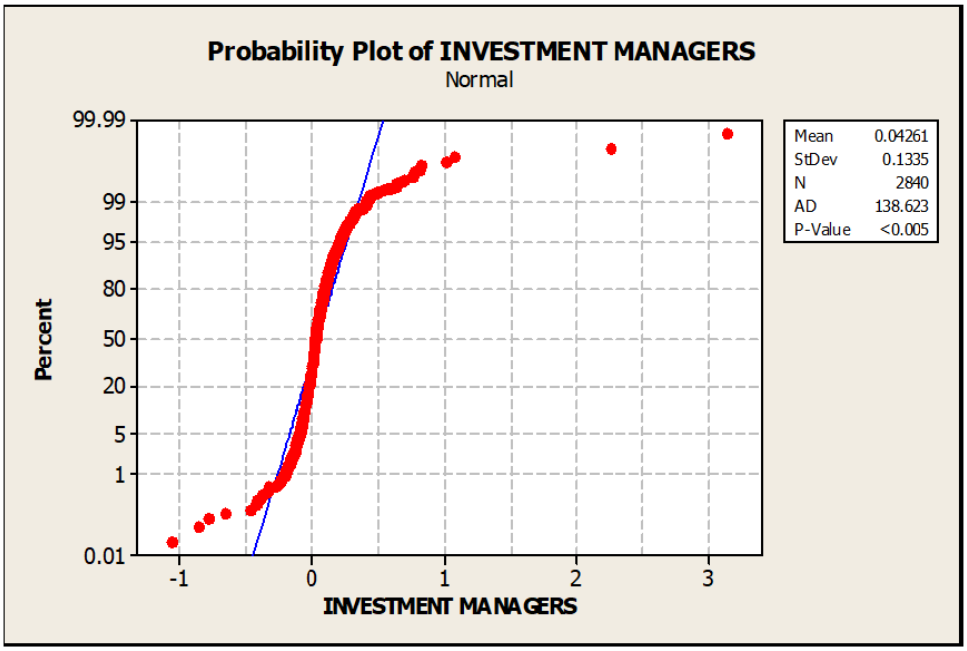

Figure (3): Anderson-Darling test for the Normality of Ownership by Brokerage Firms

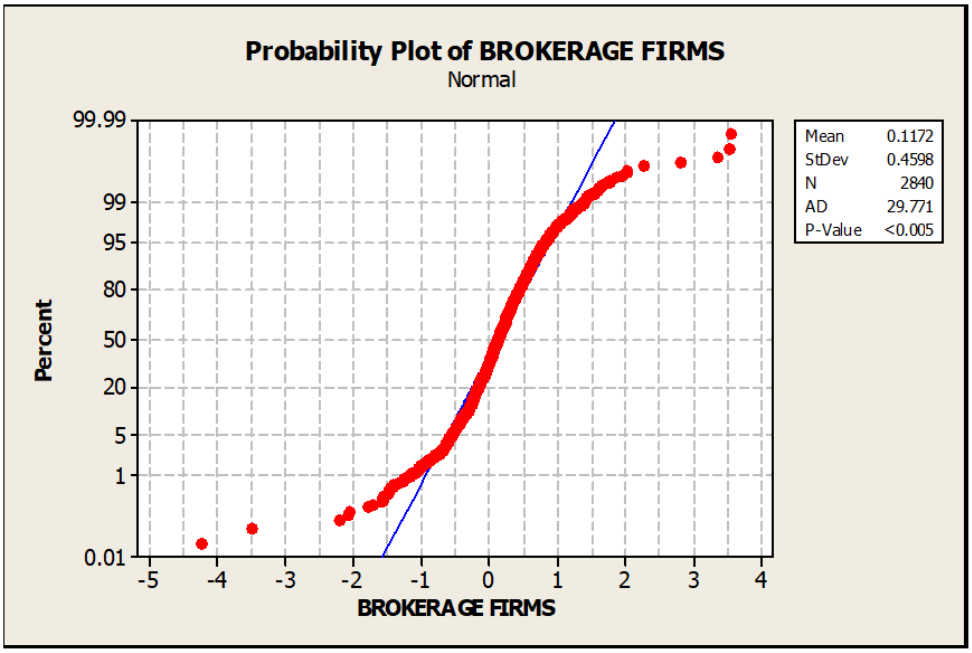


Figure (4): Anderson-Darling test for the Normality of Ownership by Individual Investors

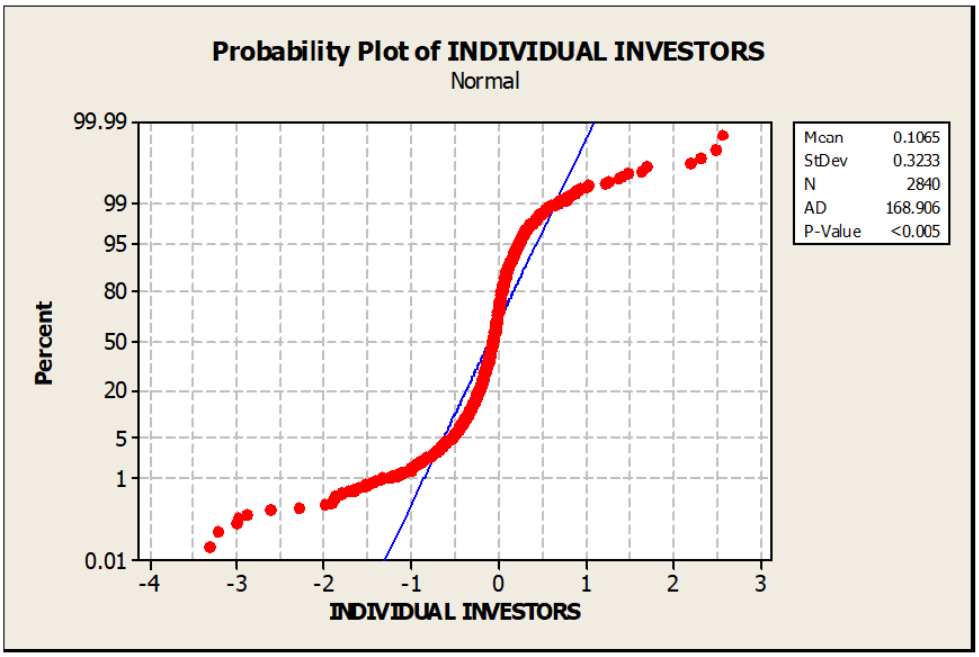

*Table 1: Definitions and measures of the dependent and independent variables*

| | **Firm Growth** | **Proxies** | **References** |
|---|---|---|---|
| *Dependent Variable* | Growth in Sales | Continuous compound growth rate of sales | Davidsson and Wiklund, 2000 |
| *Independent Variables* | LN Individual investment | Change in each of the three ownership variables downloaded from Thomson Reuters Eikon | Barber and Odean (2000) |
| | LN Brokerage firms' ownership | | Shleifer and Vishny (1997); McConnell and Servaes (1990); Del Guercio and Hawkins (1999); Cornett et al. (2007); and Chen et al. (2008) |
| | LN Investment managers' ownership | | |
| *Role of agency problems* | Information asymmetry | | |
| | Deviation of *q*-ratio from 1 | *q*-ratio | Chung and Pruitt, 1994; Koch and Shenoy, 1999: Stein, 2003 |
| | Sensitivity of stock returns to expected ROE | ROE and stock prices | Krishnaswami and Subramaniam, 1999; Christie, 1987; Dierkens, 1991; Eldomiaty, et al., 2019 |
| | Probability of Adverse selection | The probability of default (PD) using Black-Scholes Option Pricing model | Eldomiaty, et al., 2019 |
| *Control Variables* | | | |
| *Firm Size (Small, Medium, Large)* | Ln (Total Assets) | Value of Total Assets | Dummy variables (dichotomous 0,1) |
| | Ln (MVE) | Market Value of Equity | |
| *Industry Type* | | Type of industries form 1-10 except industry 3 (Financial firms) | Dummy variables (dichotomous 0,1) |

*Table 2: Descriptive statistics for ownership structure*

| | Investment Managers | Brokerage Firms | Individual Investors |
|---|---|---|---|
| Mean | 0.665 | 0.022 | 0.313 |
| Standard Error | 0.003 | 0.000 | 0.003 |
| Median | 0.678 | 0.019 | 0.300 |
| Standard Deviation | 0.165 | 0.013 | 0.168 |
| Sample Variance | 0.027 | 0.000 | 0.028 |
| Kurtosis | 2.610 | 8.684 | 2.862 |
| Skewness | -0.944 | 2.200 | 0.978 |
| Range | 1.000 | 0.113 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 |
| Maximum | 1.000 | 0.113 | 1.000 |
| Sum | 2141.777 | 71.873 | 1006.351 |
| Count | 3,220 | 3,220 | 3,220 |

**Table 3: The Results of heterogeneity levels (Low-High) of information asymmetry**

| Goldfeld-Quandt Test | High-Low Beta ROE | High-Low Probability of Default of ROE | High-Low *q*-ratio |
|---|---|---|---|
| F statistic | 1.3167** | 1.2887** | 2.1895** |
| Critical F (Right Tail) | 1.1382 | 1.0936 | 1.1336 |
| Two-Tail | | | |
| Critical F (Upper) | 0.8571 | 0.8986 | 0.8612 |
| Critical F (Lower) | 1.1668 | 1.1125 | 1.1611 |

* Significant at 5%

*Table 4: The association between ownership structure and growth of the firm*

| Variables | Proxies of Information asymmetry (Favorable Selection-Low Information Asymmetry) | | | Proxies of Information asymmetry (Adverse selection- High Information Asymmetry) | | |
|---|---|---|---|---|---|---|
| Dependent Variable | Growth of Sales | | | Growth of Sales | | |
| | Beta ROE | PD ROE | *q* ratio | Beta ROE | PD ROE | *q* ratio |
| Constant | -0.310 | 0.355 | 0.191 | 0.343 | -0.741 | -0.516 |
| Investment Managers | 0.053 | 0.068 | 0.056 | 0.244* | 0.016 | 0.072 |
| Brokerage Firms | 0.097*** | 0.104*** | 0.052*** | 0.103 | 0.082*** | 0.144*** |
| Individual Investors | 0.116*** | 0.124*** | 0.123*** | 0.142 | 0.098* | 0.134* |
| Industry 1 | 0.183*** | ----- | 0.124** | 0.025 | 0.197** | -0.002 |
| Industry 2 | 0.149** | -0.108 | 0.131** | 0.225 | 0.337* | -0.013 |
| Industry 4 | -0.205*** | -0.450*** | -0.310*** | -0.627** | -0.114 | -0.303* |
| Industry 5 | 0.097 | -0.197* | -0.011 | -0.088 | 0.178 | ----- |
| Industry 6 | 0.117 | 0.039 | 0.035 | -0.269 | 0.056 | 0.018 |
| Industry 7 | -0.115 | -0.368*** | -0.280*** | -1.061*** | -0.037 | -0.115 |
| Industry 8 | ----- | -0.101 | ----- | ----- | ----- | -0.215* |
| Industry 9 | 0.703*** | 0.606*** | 0.891*** | 0.904*** | 0.779*** | 0.460*** |
| Industry 10 | 0.453*** | 0.446** | -0.150 | ----- | 0.346* | 0.481** |
| TASMALL | 0.491*** | ----- | ----- | ----- | 0.492*** | 0.448*** |
| TAMED | 0.199*** | -0.213*** | -0.152*** | -0.154 | 0.233*** | 0.242** |
| TALARGE | ----- | -0.433*** | -0.304*** | -0.843*** | ----- | ----- |
| MVESMALL | -0.293*** | -0.103 | -0.139*** | 0.344* | 0.349*** | 0.302*** |
| MVELARGE | 0.141*** | 0.068 | 0.062 | 0.339 | 0.558*** | 0.419*** |
| N | 2479 | 1415 | 1822 | 153 | 1289 | 956 |
| F statistics (Sig F) | 17.519*** | 13.016*** | 21.761*** | 4.679*** | 10.725*** | 5.472*** |
| $\overline{R}^2$ | 0.090 | 0.113 | 0.146 | 0.253 | 0.102 | 0.066 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SE | 0.909 | 0.845 | 0.778 | 0.88 | 0.963 | 1.046 |
| Durbin-Watson | 1.935 | 1.677 | 1.920 | 1.916 | 1.868 | 2.032 |

**Notes**

*Investment managers* is estimated as the *ln* of investment managers' ownership between time *t and t-1*; *Brokerage firms* is estimated as the *ln* of brokerage firms' ownership between time *t and t-1; Individual investors* is estimated as the *ln* of individual investors' ownership between time *t and t-1*; Industry 1-10 corresponds to industry dummies as classified in Table 1; TASMALL, TAMED, TALARGE stands for Total Assets for small, medium and large firms; while, MVESMALL and MVELARGES stand Market Value of Equity for small and large firms (50:50 cut-off point). They are used as size dummies. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.