# Firm Age and Valuation: Evidence from the Korean Stock Market

J. B. Chay
Sungkyunkwan University (SKKU), Seoul, 110-745 Korea
jbchay@skku.edu

Heuijung Kim
Sungkyunkwan University (SKKU), Seoul, 110-745 Korea
heuikim@skku.edu

Jungwon Suh
Sungkyunkwan University (SKKU), Seoul, 110-745 Korea
jungwonsuh@skku.edu

This draft: February 18, 2014

**Abstract**

Using Korean stock market data, we document evidence that firm age is a key determinant of firm value. Specifically, firm value (measured by the market-to-book equity ratio) has a downward sloping relation with firm age (measured by the number of years since IPO). We also find that profitability and capital expenditures decline as firms age, suggesting that firms may become less valuable with age as they become less profitable and run out of investment opportunities. Our evidence also suggests that firms conduct IPOs by taking advantage of a small window of opportunity for listing during which their profitability is temporarily at its peak. Because this profitability is not sustainable, IPO issuers experience sharp drop in profitability, contributing to a negative relation between firm value and age in the post-IPO period. The learning hypothesis of Pástor and Veronesi (2003) is unable to explain the negative firm age-value relation in the Korean stock market, given that uncertainty does not decline with age and that the negative relation is almost non-existent among dividend-non-payers.

*JEL classification:* G10, G30
*Key words:* firm age, market-to-book, firm maturity, IPO window, learning hypothesis

## 1. Introduction

Conventional wisdom has it that corporations experience material changes in their characteristics as they age. For example, there is a popular belief that firms run out of investment opportunities as they mature. Surprisingly, however, it is uncommon that extant research explicitly considers the role of firm age in shaping corporate finance variables such as firm value. For example, while Grullon, Michaely and Swaminathan's (2002) maturity hypothesis assumes that firms' dividends increase as they enter the maturity stage, their analysis does not examine firm age per se. Similarly, DeAngelo, DeAngelo and Stulz's (2006) life-cycle hypothesis makes the same assumption but these authors do not explicitly consider firm age. The study of Pástor and Veronesi (2003) is a rare exception in that they consider firm age explicitly, specifically, in relation to valuation, positing that firm value declines over a firm's lifetime as investors learn about the firm's profitability (or as uncertainty resolves over time).

The purpose of the current study is to determine whether firm value has a systematic relation with age and, if so, to explore explanations for such a relation. Our initial empirical investigation is conducted on a sample of Korean firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. Following Pástor and Veronesi (2003), we use the number of years since a firm's listing as our measure of firm age and the market-to-book equity ratio to measure firm value. Univariate analysis suggests that firm value has a downward sloping relation with firm age. To elaborate, the median market-to-book tends to drop precipitously during the first several years after listing. While this median increases somewhat for firms that are 9 and 10 years old, it slides thereafter. Interestingly, the negative firm age-value relation is driven by dividend-payers because it is obtained among dividend-payers, but not among dividend-non-payers. The firm value of dividend-non-payers varies considerably across age groups, not displaying any downward or upward trend pattern.

Among the firm characteristics we consider that could account for the negative firm age-value relation, profitability and capital expenditures exhibit downward sloping patterns as firms age, suggesting that the negative firm age-value relation could be ascribed in part to declining profit and the shrinking investment opportunity set that firms face as they age. On the other hand, stock returns and stock return volatility do not display any particular pattern that could link them to the negative firm age-value relation.

We also run a regression of firm value on age after controlling for previously identified determinants of firm value, such as the contemporaneous and future values of profitability and stock returns. In both OLS regressions (with year fixed effects) and Fama-MacBeth regressions, the estimated coefficient on firm age is significantly negative for the whole sample. In particular,

the negative effect of firm age on value remains significant even after controlling for profitability and capital expenditures—the two firm characteristics that display downward sloping relations with firm age—suggesting that there is more than declining profitability and investment opportunities behind the negative firm age-value relation. Our regression results also indicate that the significantly negative effect of firm age on valuation is observed for dividend-payers, but not for dividend-non-payers.

We also examine a longer time period that spans more than 30 years from 1981 to 2011 in order to derive a more reliable conclusion and to also perform a variety of additional robustness checks, such as controls for IPO cohort effects and firm fixed effects.[1] Our results remain virtually unchanged for this extended sample period—that is, firm value has a significantly negative relation with age and this negative relation is more pronounced for dividend-payers than for dividend-non-payers. These findings hold even after we exclude firms that are relatively young, so our findings are not driven entirely by the sharp decline in firm value in the first several years after IPOs. These findings also hold regardless of whether we drop inactive firms as of the end of the year 2011; whether firms are affiliated with a *chaebol*; or whether we control for industry fixed effects. Further, these findings continue to hold when we account for IPO cohort effects—by adding dummy variables each of which equals one for firms that issue IPOs in the same fiscal year and zero otherwise—suggesting that the negative firm value-age relation tends to be significant for each IPO cohort (i.e., firms that enter the stock market in the same year). Finally, our findings remain unchanged in firm fixed effects regressions, suggesting that the negative firm value-age relation (for all sample firms or for dividend-payers) is not just a cross-sectional phenomenon but a reflection of within-firm variation in firm value across age.

To gain further insight into the negative firm age-value relation, we examine a sample of firms for which firm value and key firm characteristics are available for pre-IPO years. Interestingly, firm value tends to increase sharply several years prior to IPOs before it begins a downward trend. Also, profitability surges substantially several years prior to IPOs although it declines greatly following IPOs. Hence, it appears that the pre-IPO increase in firm value is driven by a similar pre-IPO increase in profitability. However, accruals do not display any discernible upward trend in the years surrounding IPO issuance; hence there is little evidence that IPO issuers engage in aggressive earnings management to make them look attractive to investors. These findings suggest that firms conduct IPOs during which their profitability is

[1] When firm fixed effects regressions are estimated for a relatively short sample period, results are not so meaningful because we have to work with a short variation over time.

temporarily at its peak. While the high pre-IPO profitability appears to push up the pre-IPO firm value, the rapid post-IPO decline in profitability indicates that such high profitability is short-lived, thereby contributing to the negative firm age-value relation in the post-IPO period.

In search of the forces that shape the negative firm age-value relation in the Korean stock market, we consider several hypotheses. Our evidence is most consistent with two hypotheses: "the firm maturity hypothesis" and "the IPO window hypothesis." First, the firm maturity hypothesis, as proposed by Grullon et al. (2002) and DeAngelo et al. (2006), posits that firm value could decrease because firms experience declining profit and a shrinking investment opportunity set as they age. Indeed, our evidence shows that the downward trend in firm value in the post-IPO years is accompanied by declining profitability and capital expenditures. However, given that the negative firm value-age relation remains significant after controlling for profitability and capital expenditures, the firm maturity story alone cannot explain the entirety of the negative firm age-value relation.[2] Second, the IPO window hypothesis postulates that firms conduct IPOs by taking advantage of a small window of opportunity during which their actual or perceived profitability is at its peak or temporarily high—that is, before that window of opportunity for IPOs closes. Our analysis of pre-IPO years provides support evidence in support of this hypothesis in the Korea stock market.[3] Our evidence suggests that the high levels of pre-IPO profitability, albeit not sustained, result in high pre-IPO valuations and that the rapid post-IPO decline in profitability—causing a similar decline in firm value—contributes to the negative firm age-value relation in the post-IPO period.[4]

On the other hand, our evidence casts doubt on the ability of the learning hypothesis of Pástor and Veronesi (2003) to account for the negative firm age-value relation in the Korean stock market. While these authors identify a significantly negative firm age-value relation in the U.S. stock market, our evidence differs from theirs in two important respects. The learning hypothesis posits that uncertainty creates high valuation of young firms but the resolution of uncertainty over time—as investors learn gradually about the firm's true profitability—results in a decline in valuation as firms age.[5] Pástor and Veronesi (2003) provide two findings to validate

[2] We acknowledge that this finding could be obtained because our value regression model cannot adequately control for future profitability. Fama and French (1998) make the same point when their value regression model fails to reject a significant relation between dividends and firm value even after controlling for lead values of profitability and the change in firm value.

[3] This is an original hypothesis that we propose in this study; to our knowledge, extant U.S. studies have not considered this hypothesis. Unlike U.S. stock exchanges, the Korea Exchange imposes a minimum profitability condition (specifically, return on equity of at least 10 percent) on firms that apply for listing.

[4] We acknowledge that this hypothesis hinges on the assumption that investors are unable to foresee the post-IPO plunge in profitability or they do not use appropriate discount rate in valuing IPO issuers.

[5] To derive this prediction, Pástor and Veronesi (2003) assume a convex relation between growth and market-to-book such that growth is increasing in uncertainty. They further assume that because growth is

their hypothesis: (1) stock return volatility gradually decreases (almost monotonically in terms of median values) with firm age, suggesting that uncertainty is resolved across time and (2) the negative firm age-value relation is more pronounced among dividend-non-payers. However, our analysis of Korean stock market data shows that stock return volatility does not decline with firm age. Our analysis also shows that the negative firm age-value relation is *not* more pronounced among dividend-non-payers than among dividend-payers.

The main contribution of the present study is to perform a formal test of the relation between firm age and value using data from an emerging stock market, that is, Korea. While our finding of a negative firm age-value relation in Korea is similar to the one reported in the U.S. study of Pástor and Veronesi (2003), our evidence does not support their learning hypothesis. Instead, according to our evidence, the firm maturity hypothesis and the IPO window hypothesis have some explanatory power to account for the negative firm value-age relation in Korea. However, it is unlikely that these two hypotheses can explain the entirety of the negative firm value-age relation in Korea, given that this negative relation remains significant after controlling for profitability and investment opportunities and that it is observed over quite a long period after IPOs. We are open to alternative or complementary explanations. For example, an explanation based on investor perception or cognition is plausible. Specifically, older firms may fall out of favor with investors due to investor perceptions or cognitive biases regarding the growth (or lack thereof) prospect of those firms. On the other hand, we are skeptical that the negative firm age-value relation arises from overpricing of IPO shares in that IPO shares are unlikely to be overpriced relative to industry peers in light of the industry practice that IPO prices are set according to the comparables approach.[6] We are also skeptical that this market timing behavior—which states that firms issue IPOs when similar listed firms are traded at a premium—drives our results. This is because the negative firm age-value relation is observed quite generally across different groups of firms sorted by IPO years (as shown in our IPO cohort effects regressions), suggesting that this negative relation could be obtained irrespective of whether firms are overvalued or undervalued across time.

Finally, we consider whether several explanations put forth for the long-run IPO

---

a function of profitability less dividend yield, dividends weaken the convex relation between growth and firm value. This assumption suggests that the effect of uncertainty will be more pronounced among dividend-non-payers—that is, that the learning effect will be greater for dividend-non-payers. Another key assumption in their study is that uncertainty is firm-specific (and so idiosyncratic and diversifiable) such that it affects firm value through its positive effect on expected future growth, not through its effect on the discount rate.

[6] However, one could oppose this view based on the finding of Kim and Ritter (1999) that comparables (e.g, the mean market-to-book ratio of industry peers) have relatively poor predictive power for actual post-IPO multiples of firms conducting IPOs, largely because of the wide within-industry variation of these ratios.

underperformance could help to explain the negative firm age-value relation.[7] Indeed, it is possible that the IPO price reflects the demand of only the most optimistic investors and, as the variance of opinions decreases, the stock price drops over time (Ritter and Welch, 2002; Miller, 1977). Also, as Heaton (2002) suggests, managerial over-optimism may be at play, if managers overinvest using the proceeds from IPOs with poor returns as a consequence. Still, these explanations from studies on the long-run IPO underperformance have limited explanatory power for our findings at hand because our evidence is distinctive in two critical respects. First, the negative firm age-value relation is present over an extended time period, not just over the first three to five years after IPOs as commonly examined in the IPO literature. Second, our evidence of firm value (as measured by market-to-book) declining with age implies that stock returns would be generally negative over time as firms age. In contrast, the long-run IPO underperformance does not necessarily predict negative stock returns. As Loughran and Ritter (1995) document, even if IPO stocks underperform comparable stocks over a three-to-five year period, their raw stock returns remain positive on average.

The rest of the paper is organized as follows. Section 2 describes our data and methodology. Section 3 conducts empirical analyses and describes results. Section 4 concludes the paper.

## 2. Data and methodology

We construct our dataset from firms that are listed in the Korea Composite Stock Price Index (KOSPI) market of the Korea Exchange (KRX) over the period 2000-2011. The stock exchange in Korea consists of two markets: the KOSPI market and the Korean Securities Dealers Automated Quotations (KOSDAQ) market. We concentrate on the KOSPI market in constructing our dataset because the short track records of firms listed in the KOSPDAQ market may not be appropriate for analyzing the relation between firm age and value.[8] We use the *FnGuide* database to collect or calculate all our variables for this study. We drop firm-years with no records of either book assets, closing share price at fiscal year-end, or IPO date. In the end, our final sample consists of 8,234 firm-years from 913 distinct firms over the period 2000-2011. This sample includes both active and inactive firms as of the end of 2011.

[7] For example, refer to the discussion in Ritter and Welch (2002, p.1821). Among the key studies, Loughran and Ritter (1995) find that issuers underperform non-issuers substantially in terms of five-year holding period returns, even after controlling for firm size and market-to-book.

[8] The KOSDAQ market was established only in 1996, so firms in that market are much younger than those in the KOSPI market. The maximum and median firm ages are only 23 years and 6 years, respectively, for firms in the KOSDAQ market as of December 2012, if we measure firm age as the number of years since listing. Nevertheless, we also find that there is a significantly negative relation between firm age and value for firms in the KOSDAQ market (results unreported).

The two key variables in our investigation are firm age and firm value. Following Pástor and Veronesi (2003), we measure firm age by the number of years since a firm's listing or IPO issuance (*AGE_IPO*) and firm value by the market-to-book equity ratio (*MB*). For example, if a firm is listed in 2005, we consider the firm to be one year old as of 2005 and to be eight years old as of 2012. The maximum and median values of firm age for our sample firms are 56 and 17, respectively.[9]

In analyzing the relation between firm age and valuation, we begin by tabulating and graphically illustrating firm value across groups of firms with the same age. We also examine variations in a range of firm characteristics, such as profitability and capital expenditures, across firm age. Ultimately, we estimate the following value regression model in analyzing the firm age-value relation after controlling for factors that could affect firm value:

$$\begin{aligned}\log(M/B)_{i,t} = {} & \beta_0 + \beta_1 AGE\_IPO_{i,t} + \beta_2 DIV\_DM_{i,t} + \beta_3 Leverage_{i,t} \\ & + \beta_4 Size_{i,t} + \beta_5 ROE_{i,t} + \beta_6 ROE_{i,t+1} + \beta_7 ROE_{i,t+2} + \beta_8 ROE_{i,t+3} \\ & + \beta_9 Return_{i,t+1} + \beta_{10} Return_{i,t+2} + \beta_{11} Return_{i,t+3} + \varepsilon_{i,t}\end{aligned}$$

where the dependent variable is the natural logarithm of the market-to-book ratio (log(*MB*)) and the key explanatory variable is firm age (*AGE_IPO*). This model controls for the dividend-payment dummy (*DIV_DM*), leverage (*Leverage*) and firm size (*Size*). The model also controls for future stock returns and profitability. As proxies for future stock returns and profitability, we use 1- to 3-year lead variables of stock returns (*Return*) and profitability (*ROE*). A similar value regression model is estimated by Pástor and Veronesi (2003). Cohen, Polk and Vuolteenaho (2003) argue that approximately 20-25 percent of the market-to-book ratio information reflects expected stock returns and 70-75 percent expected profitability. These authors, along with Pástor and Veronesi (2003), include future stock returns and profitability up to 15 years and 25 years, respectively, in their regressions.[10] Similarly, Fama and French (1998) control for lead values of profitability and the change in firm value in their value regressions. Appendix A1 provides definitions of the variables we use in this study.

[9] An alternative measure of firm age, the number of years after the firm's foundation, can be calculated for our sample firms using the foundation year available for each firm. However, the market value is generally not available in the period prior to IPOs, which makes it difficult to conduct our investigation using this alternative measure.

[10] Because we work with a relative short time series—the main sample of 2000-2011 and the expanded sample 1981-2011, we are constrained from including as many lead values of stock returns and profitability in our regressions.

## 3. Empirical results

### *3.1. Descriptive statistics*

Table 1 presents summary statistics for our key variables. The mean and median firm ages for our sample firms are 18.844 and 17.000, respectively, as we measure firm age by the number of years since IPO (*AGE_IPO*). Over the sample period 2000-2011, the oldest firm is 56 years old, but there are several one-year old firms as well (i.e., firms that first listed during the most recent fiscal year). The mean and median values of the market-to-book ratio (*MB*), our proxy for firm value, are 0.892 and 0.624, respectively, for our sample firms. These values indicate that Korean firms trade at generally low prices in the sense that the market-to-book ratio for the majority of our sample firms is below 1. This reflects a well-documented pattern that Korean firms suffer low valuation relative to comparable firms in other countries (e.g., Sim and Suh, 2007). The reported statistics for market-to-book also indicate that the distribution of firm value is positively skewed. For example, the maximum market-to-book of 3.482 is high compared to the median value of 0.624. We deal with this skewness in the distribution of firm value by using the logarithm of market-to-book (log(*MB*)) as the dependent variable in our regression analysis. At the bottom of the table, the mean value of the dividend payment indicator variable (*DIV_DM*) is 0.658, so more than 60 percent of our sample firms pay dividends.

Table 2 presents median values of our key variables for each year in the sample period. The median value of firm age (*AGE_IPO*) ranges from 13 to 22 and tends to increase as we move from the early to the later part of the sample period, suggesting that the effect of firms' aging over time outweighs the effect of newly listed firms entering the sample. The numbers in the table also suggest that firm value, as measured by market-to-book (*MB*), varies substantially across the sample years. The median market-to-book tends to be considerably greater in the later part of the sample period than it is in the early part, although it is beyond the scope of this paper to determine the source of this pattern. Indeed, the data present an interesting temporal pattern, namely, the medians of both firm age (*AGE_IPO*) and valuation (*MB*) tend to increase together, as we go from the early to the later part of the sample period. This temporal pattern could work to create a positive relation between firm age and valuation. However, as we show below, firm age and value are negatively related. Hence, it appears that the negative firm value-age relation arises, not because of the temporal co-movement in the two variables, but in spite of it.

Turning our attention to other firm characteristics, we find that the median leverage (*LEVERAGE*) exhibits a declining pattern over the sample period. As the popular press has pointed out so often, Korean firms during the 2000s were reluctant to increase capital expenditures, preferring to hoard cash. This tendency is reflected in the declining median capital

expenditures (*CAPEX*) and growing cash holdings (*CASH*) shown in Table 2.

Table 3 presents the key finding of this research, the negative relation between firm age and valuation. Panels A and B report the median and mean values respectively of key variables for each age group up to 20 years of age. Because both the medians and the means of these variables reveal essentially the same patterns, we focus on the median values (Panel A) to describe main features from the table. Panel A shows that the median firm value tends to decline with firm age. The median market-to-book ratio is as high as 1.08 in year 1 but it decreases steadily over time, although this downward movement is not completely monotonic. The median market-to-book is as low as 0.48 for the group of firms that are 15 years old. While firm value tends to increase somewhat for firms older than 15 years, the median market-to-book ratios (e.g., 0.74 for the 19-year-old group) do not return to the level held by younger firms (e.g., 0.76 for the-5-year-old group). Interestingly, this negative relation between firm age and valuation is distinct among dividend-payers, but it is somewhat weak among dividend-non-payers. The median market-to-book ratio for dividend-payers is 1.13 for newly listed firms (i.e., *AGE_IPO* = 1) and it declines almost monotonically until firms reach age 15 when the median ratio is 0.49. However, for dividend-non-payers, the median market-to-book ratio for newly listed firms is relatively low at 0.88 and it is highly variable across the age groups. The median firm value drops to the range of 0.44-0.53 when firms are 6-8 years old and then increases to 0.73 and 0.83 for firms that are 8 and 9 years old, respectively. By the time these dividend-non-payers are nine years old, then, their valuation is almost at the same level as that for newly listed non-payers.

Table 3 also presents the median values of other firm characteristics for each age group. The table shows that profitability (*ROE*) for all sample firms declines with age. The median profitability for newly listed firms is 0.16 and steadily decreases as we move to older age groups. The median profitability for firms of age 20 is 0.08, half that of newly listed firms. Therefore, it appears that our key finding, the general decline in firm value as firms age, is accompanied by a similar decline in profitability, suggesting that profitability could be a prime reason for the negative relation between firm age and valuation.

### *3.2. Graphical illustration*

To aid our understanding of the evolution of firm value and selected firm characteristics across firm age, we plot the median values of these variables for each age group up to age 30 in Figures 1-5.

The first graph in Figure 1 confirms the negative relation between firm age and

valuation, as reported in Table 3. The median market-to-book ratio tends to drop rather precipitously during the first eight years after listing as firms lose almost half of their value over this period. While the median firm value increases somewhat for firms 9 and 10 years old, it continues to slide downward until they are age 15. Firm value increases for age groups older than 15 years, but it does not regain the level of firm value for those firms younger than 10 years. Firm value drops again for firms older than 23 years. The second graph in Figure 1 suggests that this negative relation between firm age and valuation is driven mostly by dividend-payers, as the pattern of evolution in firm value for dividend-payers closely follows that for all firms in the first graph. In contrast, the negative relation between firm age and valuation is weak or almost non-existent for dividend-non-payers. The median firm value for dividend-non-payers is highly variable across different age groups, which probably reflects the fact that cash flows for these firms are unstable.

Our main sample of firms includes both active and inactive firms. To ensure that including or excluding inactive firms does not affect our results, Figure 2 graphs the relation between firm value and age for the sample of firms that are active in the KOPSI market of the Korea Exchange as of December 31, 2011—excluding firms that exited the stock market during the sample period. As compared to our main sample, which consists of 8,234 firm-years with 913 distinct firms, this sample includes 7,358 firm-years with 735 distinct firms. Essentially, the graphs in both panels provide the same patterns that we obtained earlier from the main sample: firm value tends to decline as firms age (in Panel A), but this downward sloping pattern is weak for dividend-non-payers (in Panel B). Hence, our main results are obtained regardless of whether we include inactive firms or not.

Figures 3-6 plot other key firm characteristics across different age groups, providing clues as to what lies behind the downward sloping pattern of firm value across firm age, particularly, for dividend-payers. The first graph in Figure 2 shows that profitability (*ROE*) has a downward-sloping relation with firm age, as *ROE* drops sharply in the first four years after IPO and then flattens out a bit before turning downward again. The median profitability of firms older than 13 years is generally less than half of the median profitability for newly listed firms. The second graph in Figure 2 shows that this decline in profitability across age is obtained for dividend-payers, but not for dividend-non-payers. In contrast to the median profitability for dividend-payers that gradually and steadily slides downward across age groups, the median profitability of dividend-non-payers is highly volatile and has no particular downward trend. This pattern is consistent with the notion that cash flows for dividend-non-payers are highly uncertain or unstable (e.g., Chay and Suh, 2009). Overall, profitability follows a downward

sloping pattern across firm age similar to that of firm value, if we restrict attention to all sample firms or dividend-payers. Given that profitability is a key determinant of firm value, this result suggests that the negative relation between firm age and valuation is attributed in part to this negative relation between firm age and profitability. That is, it is possible that our sample firms lose value as they age because they become less profitable over time. However, as we show below in the regression analysis, the negative relation between firm age and valuation remains significant even after controlling for profitability, suggesting that it takes more than declining profitability to explain this negative relation.

Figure 4 plots the median capital expenditures across age groups. The first graph for all sample firms indicates that capital expenditures drop precipitously from firms 1 year old to firms 2 years old and then tend to decline gradually afterward up to firms 14 and 15 year old. This result may suggest that firms gradually run out of investment opportunities as they mature. Since our capital expenditure measure is scaled by (the beginning-of-the-year) book assets, this downward sloping pattern may partly reflect the effect of firm growth, as it is increasingly difficult to achieve the same proportional growth as firms grow in size. The second graph, for dividend-payers and dividend-non-payers, shows that the downward sloping pattern is strong for dividend-payers, but is relatively weak for dividend-non-payers.

Figure 5 graphs annual stock returns across age groups. The first graph, for all sample firms, shows that stock returns are highly variable and do not display any upward or downward trend across age groups. As the second graph shows, stock returns for dividend-payers are generally higher than those for dividend-non-payers for all age groups. The median stock return for newly listed firms is negative for both dividend-payers and non-payers, while this median improves to some extent in the next two years. Similarly, Pástor and Veronesi (2003) report that the median annual stock return for their sample firms is negative in each of the first three years after IPO. This result could be related to the well-documented long-run underperformance of IPOs, which refers to the pattern that the stock price of newly listed firms substantially underperforms the price of firms with similar size and market-to-book (e.g., Ritter and Welch, 2002; Loughran and Ritter, 1995).

Finally, Figure 6 plots stock return volatility—our proxy for uncertainty—across age groups. In the first graph, for all sample firms, stock return volatility drops in the second year after listing and remains at about the same level until the firm reaches age 12, when return volatility is fairly high. Overall, stock return volatility shows no particular relation to age, except that there are occasional spikes in a few age groups. This pattern holds for both dividend

payers and non-payers, as the second graph illustrates.[11] Not surprisingly, the median stock return volatility of dividend-non-payers is considerably higher (more than twice as high in many age groups) than that of dividend-payers.

In summary, profitability and capital expenditures exhibit downward sloping patterns as firms age, leading us to speculate that the negative firm age-value relation could be at least partly ascribed to declining profit and a shrinking investment opportunity set as firms age. On the other hand, there is no particular pattern in stock returns or stock return volatility that would link these variables to the negative firm age-value relation. We must emphasize that in contrast to what we report on stock return volatility in this research, Pástor and Veronesi (2003) find a gradually decreasing (almost monotonically decreasing in terms of the median value) stock return volatility as firms age in the U.S. data. This finding of these authors forms the basis for the uncertainty hypothesis—that uncertainty creates high valuation of young firms but the resolution of uncertainty over time causes their valuation to decline as firms age. Given that a similar decline in uncertainty (as measured by stock return volatility) is not found in the Korean stock market, we argue that this uncertainty hypothesis may not be able to account for the time variation of firm value across age.

### *3.3. Regression results*

The purpose of our regression analysis is to determine the effect of firm age on valuation after controlling for factors that are assumed to affect firm value. Table 4 reports correlations among the variables used in our regression analysis. Several variables, such as leverage, cash and stock return, are correlated significantly with log(*MB*), our measure of firm value, which suggests that one should control for these variables in assessing the effect of firm age in valuation.

Table 5 reports the results of regressions that estimate the effect of firm age (*AGE_IPO*) on firm value (log(*MB*)). Our set of control variables is similar to that used in Pástor and Veronesi (2003). We take two approaches in implementing regression analysis: OLS regressions with year-fixed effects and the Fama-MacBeth two-step approach. OLS regression results in Panel A show that firm age has a significantly negative effect on firm value. For example, the estimated coefficient on *AGE_IPO* is negatively significant (at -0.009) in Column (1). This result is consistent with the downward-sloping relation between firm age and valuation that we documented earlier. The coefficient on *AGE_IPO* remains significantly negative in Column (2)

[11] In unreported results, we find that firm age does not have a systematic relation with idiosyncratic volatility (estimated based on the market model). Hence, firm age does not have a systematic relation with stock return volatility, whether the stock return volatility is measured by the standard deviation of stock returns or idiosyncratic volatility.

in which we add four control variables: the dividend-payment dummy, leverage, firm size and profitability. In Columns (3) through (5), we include lead variables of stock returns and profitability to address the concern that firm values reflect future stock returns and profitability. Indeed, all three lead variables of profitability ($ROE_{t+1}$, $ROE_{t+2}$ and $ROE_{t+3}$) and stock returns ($RETURN_{t+1}$, $RETURN_{t+2}$ and $RETURN_{t+3}$) enter significantly with positive or negative signs, respectively, suggesting that these future values could be important determinants of the concurrent firm value. However, the estimated coefficient for *AGE_IPO* still remains negative and significant. Panel B of Table 5 provides similar evidence using the Fama-MacBeth two-step approach, as the estimated coefficient on *AGE_IPO* is negative and significant in all Columns (6)-(10), suggesting that firm value decreases with age.[12]

Table 6 shows the effect of firm age on valuation after splitting our sample into two groups: dividend-payers and dividend-non-payers. This analysis is motivated by our earlier finding from the graphical analysis that the negative relation between firm age and valuation is strong for dividend-payers, but not for dividend-non-payers. OLS regression results in Panel A confirm that a significant negative relation between firm age and valuation is obtained only for dividend-payers. For example, in Columns (1) and (2), the estimated coefficients on *AGE_IPO* are negatively significant at -0.012 and -0.007, respectively, for dividend-payers. In contrast, in Columns (3) and (4), these coefficients are either insignificant or positive at -0.004 and 0.002, respectively, for dividend-non-payers. In Panel B, the results from the Fama-MacBeth two-step approach also suggest that the negative effect of firm age on valuation is significant for dividend-payers but not for dividend-non-payers. For example, the estimated coefficient on *AGE_IPO* for dividend-non-payers is positive, albeit insignificant, when we control for firm characteristics in Column (8). Another important feature in the results in Table 6 is that the model's fitness, as measured by the adjusted *R*-square, is substantially higher in the regressions for dividend-payers than in the regressions for all sample firms (reported in Table 5). For example, Column (2) of Panel A in Table 6 shows that the adjusted *R*-square is as high as 50.3 percent for dividend-payers, while the adjusted *R*-square for the same regression model (Column (5)) in Panel A of Table 5 is only 28.8 percent. This observation gives an indication that the negative firm age-value relation for all sample firms is driven by dividend-payers.

[12] In unreported results, we also control for additional firm characteristics such as cash holdings, capital expenditures and stock return volatility, but the estimated coefficient on firm age remains negative and significant. We also considered alternative measures of firm age: log(*AGE_IPO*) and –1/(1+ *AGE_IPO*). The negative effect of firm age becomes much stronger in the magnitude of the estimated coefficient and *t* statistic with the estimated coefficients of log(*AGE*) and –1/(1+ *AGE*) being –0.126 (*t* = –5.20) and –1.293 (*t* = –6.12), respectively, when we use the regression model analogous in Column (5) in Panel A of Table 5.

Overall, our regression results confirm that firm value is negatively related to age. The results also suggest that this negative relation is strong only for dividend-payers, not for dividend-non-payers. Our results should be contrasted with the U.S. finding of Pástor and Veronesi (2003), who report that the negative age-value relation is significant for both dividend-payers and non-payers, but this relation is more pronounced for non-dividend-payers. These authors view the relatively strong negative relation for non-dividend-payers in their results as evidence in support of the uncertainty hypothesis. According to our results, however, the same cannot be said for the firm age-value relation for Korean firms.

### *3.3. Extended sample period (1981-2011) and a variety of robustness checks*

We now address the concern that our sample period 2000-2011 is not sufficiently long to assess the effect of firm age on valuation. We also address a related concern that our preceding analyses capture mainly the cross-sectional variation of firm value across firms of different ages (i.e., young firms vs. old firms) and not necessarily the evolution of a given firm's value over time as it ages. In the preceding analyses, our sample was restricted to the period 2001-2011, which followed the 1997-1998 Asian Financial Crisis. This restriction was in keeping with the majority of academic studies in corporate finance research in Korea that focus on the post-crisis period.[13] However, the nature of our investigation—an investigation of the effect of firm age—requires examining a longer time span in order to arrive at a more reliable conclusion. In the following regressions, we analyze an extended sample period that includes years preceding the crisis.

The sample in Table 7 covers a period of more than 30 years from 1981 to 2011.[14] In Panel A, OLS regression results suggest that firm value has a negative relation with firm age for all sample firms, as the coefficient on *AGE_IPO* is significantly negative in Columns (1) and (2). There is evidence to suggest that this negative relation is more pronounced for dividend-payers than for non-dividend-payers. The interaction between *AGE_IPO* and *DIV_DM* (i.e., *AGE*×*DIV*) enters significantly negative in Column (3). Consistent with this result for the interaction variable, the effect of firm age is significantly negative for dividend-payers in Columns (4) and (5); in contrast, this negative effect is weak for dividend-non-payers, given that the coefficient on *AGE_IPO* is not negative in Column (7). In Panel B, Fama-MacBeth regression results

[13] Two considerations should be noted here. First, Korean firms' characteristics changed substantially in the post-crisis period. For example, they became healthier financially by reducing their debt ratio substantially. Second, there was concern about the poor quality of financial statement data for Korea firms in the pre-crisis period—because of, for example, accounting fraud.

[14] 1981 is the earliest year for which we can calculate the market-to-book equity ratio from the *FnGuide* database.

provide virtually identical findings. Overall, these results suggest that our earlier findings—that there is a negative relation between firm value and age and that this relation is more pronounced among dividend-payers than among dividend-non-payers—hold for an extended sample period.

Next we perform a variety of robustness checks for the extended period 1981-2011. To save space, we report only OLS regression results. However, the Fama-MacBeth two step regression results (unreported) are qualitatively similar.

Panel A of Table 8 reports regressions of only firms that are older than 5 years (i.e., *AGE_IPO* is greater than 5) in order to account for the possibility that the negative firm value-age regression is driven by the pattern of decreasing firm value particularly prominent in the first few years after the IPO (Figure 1). However, the regression results suggest that the coefficient on *AGE_IPO* remains negative and significant for all sample firms in Columns (1) and (2). In addition, as evidenced by the negatively significant coefficient on the interaction, *AGE×DIV*, the negative firm age-value relation is more pronounced among dividend-payers than among dividend-non-payers. In short, it appears that the negative overall relation between firm value and age is not driven entirely by the sharp decline in firm value in the first several years after IPOs.

In Panel B of Table 8, regressions include only firms that are active as of the end of the fiscal year 2011 and exclude firms that exited the stock exchange during the period 1981-2011. Our intention here is to determine whether our main finding of the negative firm value-age relation is influenced by the presence of firms that exit the market early in their lives—a possibility if those firms experience a substantial drop in firm value before they exit the market. However, our regression results remain essentially unchanged after excluding those firms. The coefficient on *AGE_IPO* is significantly negative in Columns (1) and (2) and the coefficient on the interaction variable is also significantly negative in Column (3), suggesting that the overall relation between firm value and age is negative and this negative relation is stronger among dividend-payers than among dividend-non-payers.

Panels C and D of Table 8 estimate the value regression model separately for two groups of firms, *chaebol*-affiliated and non-*chaebol*-affiliated firms. It is uncertain a priori whether the negative firm age-value relation would be stronger or weaker depending on whether firms are affiliated with *chaebols*. If the key characteristics of the *chaebol* structure—such as diversified businesses and related party transactions—help affiliated firms to maintain stable profitability and growth, then *chaebol*-affiliated firms could avoid a precipitous decline in firm value as they age, weakening the negative firm value-age relation. However, the opposite prediction could be possible if we assume that corporate governance problems—such as

tunneling—are more prevalent for *chaebol*-affiliated firms. The regression results suggest that our main findings continue to hold for both *chaebol*-affiliated and non-*chaebol*-affiliated firms. To elaborate, in both Panels C and D, firm-value has a significantly negative relation with firm age, as indicated by the significantly negative coefficient on *AGE_IPO* in Columns (1) and (2). Also, in both Panels, this negative relation remains significant for dividend-payers in Columns (4) and (5), but it is weak or even non-existent for dividend-non-payers in Columns (6) and (7).

The results in Panel E show that controlling for industry fixed effects does not make a difference to our findings, as the firm value-age relation is significantly negative for all sample firms as shown in Columns (1) and (2). Also, this relation is significantly negative only for dividend-payers, not for dividend-non-payers, as shown in Columns (4)-(7).

In Panel F, we control for IPO cohort effects (i.e., IPO-year fixed effects), which allows us to evaluate whether the negative firm age-value relation is significant for individual IPO cohorts (i.e., firms that enter the stock market in the same year).[15] In controlling for the IPO cohort effect, we create a dummy variable for each fiscal year from 1981 to 2011; firms that issue IPOs in a given fiscal year receive the value of 1 for the dummy variable assigned to that fiscal year, and zero otherwise. The results suggest that our main findings continue to hold, as the coefficient on firm age is significantly negative in both Columns (1) and (2). The coefficient on the interaction variable, AGE×DIV, is significantly negative in Column (3), suggesting that the negative firm value-age relation is stronger for dividend-payers than for dividend-non-payers.[16]

Finally, in Panel G, we control for firm fixed effects. While model specifications that control for firm fixed effects could address the potential omitted variable bias, those specifications also eliminate cross-sectional variation forcing us to focus on within-firm variations (e.g. Zhou, 2001). In Columns (1) and (2), the estimated coefficient on firm age is significantly negative, which could indicate that the downward sloping firm value-age relation is significant even after controlling for unobserved time-invariant heterogeneity across firms (i.e., firm fixed effects). Again, the interaction variable, AGE×DIV, enters significantly negatively in Column (3), suggesting that the negative firm value-age relation is more pronounced for dividend-payers than for dividend-non-payers. Overall, these results provide

[15] Another role of this feature is that it allows us to account for unobservable firm characteristics that are common to each IPO cohort.

[16] We also performed an alternative approach by controlling for the IPO cohort effect, that is, by examining each IPO cohort separately, instead of pooling all observations in a panel regression context. The results (untabulated) suggest that the mean and median firm values of each cohort tend to decline with age and that this negative relation remains significant in regressions with controls for various firm characteristics.

evidence that our main finding of a negative firm value-age relation (for all sample firms and for dividend-payers) is not just a cross-sectional phenomenon but that it reflects within-firm variation in firm value across age.[17]

### *3.4. Firm value and profitability in the pre-IPO years*

We perform additional analyses to gain further insight into the negative firm age-value relation by examining firm value and other important firm characteristics in the years preceding IPO issuance using a sample of firms for which these variables are available for these years. This sample covers the period 1981-2012. The data come from the *FnGuide* database which compiles prices of the unlisted stocks traded in over-the-counter markets in Korea. Compared to the previous sample, this sample includes relatively few firm-year observations because firm value is available for only a small number of firms prior to IPOs.[18]

Panel A of Table 9 reports the mean and median firm values for each age over twenty-one years (AGE_IPO=-10 through AGE_IPO=10) surrounding IPO issuance. This twenty-one-year period includes both pre-IPO and post-IPO years; An IPO takes place in age 1 and hence age 0 represents the last year before IPO issuance. The most important feature of the panel is the observation that firm value reaches a fairly high level prior to IPO issuance. For example, the mean and median firm values are 1.55 and 1.02, respectively, in age -3, which are substantially greater than the corresponding values in age 0 (1.36 and 0.87, respectively) and those in age 1 (1.31 and 0.95, respectively). The numbers in the panel also indicate that firm value begins to decline before IPO issuance—although, as reported in our main results, this downward trend persists for quite a long period in the post-IPO years.

This finding of firm value rising sharply prior to IPOs opens up several possibilities that could potentially shed light on the negative firm age-value relation in the post-IPO period. We first consider the possibility that firms could be overvalued prior to IPOs. We note, however, that this overvaluation hypothesis can be given credence if there is no similar increase in profitability—a key determinant of firm value—in the pre-IPO period.

The next two panels of Table 9 provide the mean and median values of profitability measured by operating rate of return (in Panel B) and return on equity (in Panel C), respectively,

[17] In untabulated results, we also tested whether agency problems could explain the negative age-value relation in our results. As a proxy for agency problems, we used the free cash flow (FCF) measure as defined in Lehn and Poulsen (1989)—i.e., "operating income – tax – interest – dividends" scaled by book assets. We find that there is no noticeable pattern in the time-series relation between FCF and firm age. Moreover, in the regression results, the negative relation between firm age and M/B remains significant after controlling for FCF.

[18] For these firms, the share price is available because their shares are traded—albeit not frequently—in the over-the-counter market even prior to IPOs.

for each year from age -10 to age 10. These values indicate that profitability experiences a sharp increase in the pre-IPO period. For example, in Panel B, the mean operating rate of return climbs to 9.32% in age -3 from 6.72% in age -4. In Panel C, the mean return on equity surges to 20.9% in age -3 from 5.9% in age -4. Note that the pre-IPO increase in profitability is more pronounced in magnitude in return on equity than in operating rate of return, probably because the minimum profitability requirement for listing is specified in terms of return on equity.[19] Another important observation is that profitability declines substantially in the first several years after IPOs—an observation already documented above. In Panel C, as compared to the median return on equity in age 0 of 29.1%, the corresponding median in age 4 is only 12.8% for "all firms"; in other words, the median profitability becomes less than half the pre-IPO level within five years of IPOs. This post-IPO decline of profitability is particularly striking for dividend non-payers whose median return on equity in age 1 is not even positive at -3.2%.

A related question is whether the pre-IPO surge in profitability is a result of earnings management—i.e., efforts to artificially prop up profit to boost firm value prior to IPOs.[20] However, the numbers reported in Panels D and E do not support this hypothesis. For example, in Panel D, the mean and median total accruals—defined as net income less cash flows from operating activities—are negative every year from age -5 to age 0 for all firms. In Panel E, the unexpected total accruals—defined as total accruals less one-year lagged total accruals—do not display any uptrend from age -5 to age 0.[21]

Taken together, our analysis of firm value and profitability in the pre-IPO years is quite revealing. Firm value tends to increase sharply several years prior to IPOs before it begins a downward trend. Given that profitability also increases dramatically several years prior to IPOs, it is unlikely that the sharp pre-IPO increase of firm value reflects overvaluation. Further, it does not appear that the dramatic pre-IPO surge of profitability reflects aggressive earnings management, which in turn implies that the sharp pre-IPO increase of firm value is unlikely to be driven by earnings management. Based on these findings, we propose "the IPO window hypothesis", which postulates that firms conduct IPO issuance by taking advantage of a small window of opportunity during which their actual or perceived profitability is at its peak or

[19] According to the listing manual published by the Korea Exchange, there is a set of requirements that firms must satisfy to get approval for listing. Among them is a minimum profitability condition that requires that firms applying for listing achieve return on equity of at least 10 percent over the most recent three years. To our knowledge, this condition was in place at least throughout the 2000s.

[20] In a study of U.S. stock markets, Teoh, Welch and Wong (1998) find evidence that IPO issuers are eager to look good and thus adopt aggressive earnings management before IPO issuances, which results in poor earnings performance later on following IPOs as firms can no longer maintain appearances.

[21] Pourciau (1993) uses this measure of unexpected total accruals in comparing earnings management for the periods before and after CEO changes.

temporarily high—that is, before the small window of opportunity for IPOs closes. Because this profitability is not sustainable, IPO issuers experience sharp drops in profitability, thereby giving rise to a negative relation between firm value and age in the post-IPO period.

## 4. Concluding remarks

Using Korean stock market data, this paper documents evidence that firm age is a key determinant of firm value. Specifically, firm age has a negative effect on firm value and this negative effect is statistically significant and also robust to a variety of robustness checks, such as controls for key firm characteristics, year fixed effects, IPO cohort effects and firm fixed effects. Our evidence casts doubt on the ability of the learning hypothesis of Pástor and Veronesi (2003) to account for the negative firm age-value relation in the Korean stock market. Our evidence is most consistent with two hypotheses: the firm maturity hypothesis and the IPO window hypothesis. However, we acknowledge that these two hypotheses would be unable to explain the entirety of the negative firm value-age relation in Korea, given that this negative relation remains significant after controlling for profitability and investment opportunities and it is observed over quite a long period after IPOs. We are open to alternative and complementary explanations. For example, a plausible complementary explanation is the one based on investor perception or cognition, which postulates that older firms may fall out of favor with investors due to investor perceptions or cognitive biases regarding the growth (or lack thereof) prospect of those firms. On the other hand, we are skeptical that overpricing of IPO shares, or several explanations put forth for the long-term IPO underperformance in the literature can provide explanations for the negative firm age-value relation in the Korean stock market.

## Appendix

### Table A.1: Description of variables

All variables are obtained (or constructed using the data) from *FnGuide*. When control variables are scaled by total assets, we use the end-of-the-year values of total assets, except for capital expenditures that are scaled by the beginning-of-the-year values.

| | |
|---|---|
| *Main variables* | |
| AGE_IPO | The number of years since the firm's IPO |
| Market-to-book (MB) | Market equity divided by book equity, where market equity is equal to the common stock price at fiscal year-end x common share outstanding and book equity is equal to stockholder's equity less the book value of preferred stock |
| Log(MB) | The natural logarithm of the market-to-book equity ratio |
| *Other variables* | |
| Leverage | Long-term debt divided by total assets |
| Size | The natural logarithm of total assets |
| Capital expenditures (CAPEX) | Capital expenditures divided by (the beginning-of-the-year) total assets |
| Earnings | Income before extraordinary items |
| Return of equity (ROE) | Earnings divided by (the beginning-of-the-year) book equity |
| Volatility | Annualized stock return volatility; the standard deviation of daily return x $\sqrt{252}$ |
| Stock repurchases (RP) | Stock repurchases divided by total assets |
| DIV_DM | A dummy variable that equals 1 if dividends are paid to common stockholders and zero otherwise. |
| AGE×DIV | The product of firm age (AGE_IPO) and the dividend dummy (DIV_DM) |
| $ROE_{t+i}$ | Proxy for expected profitability; *i*-year lead value of ROE |
| $RETURN_{t+i}$ | Proxy for expected return; *i*-year lead value of stock return |
| Operating rate of return | Operating income before depreciation divided by total assets |
| Total accruals | Net income less cash flows from operating activities divided by sales |
| Unexpected accruals | A change in total accruals from year *t*-1 to year *t* |

## References


Chay, J. and J. Suh, 2009. Payout policy and cash flow uncertainty. *Journal of Financial Economics* 93, 88-107.

Cohen, R. B., C. Polk and T. Vuolteenaho, 2003. The value spread. *Journal of Finance* 58, 609-641.

DeAngelo, H., L. DeAngelo, and R. Stulz, 2006. Dividend policy and the earned/contributed capital mix: a test of the life-cycle theory. *Journal of Financial Economics* 81, 227-254.

Fama, E. F. and J. D. MacBeth, 1973. Risk, return and equilibrium: Empirical tests. *Journal of Political Economy* 81, 607-636.

Fama, E. F. and K. R. French, 1998. Taxes, financing decisions, and firm value. *Journal of Finance* 53, 819-843.

Grullon, G., R. Michaely and B. Swaminathan, 2002. Are dividend changes a sign of firm maturity? *Journal of Business* 75, 387-424.

Heaton, J. B., 2002. Managerial optimism and corporate finance. *Financial Management* 31, 33-45.

Hund, J. D. Monk and S. Tice, 2010. Uncertainty about average profitability and the diversification discount. *Journal of Financial Economics* 96, 463-484.

Kim, M. and J. R. Ritter, 1999. Valuing IPOs. *Journal of Financial Economics* 53, 409-437.

Lehn K. and A. Poulsen, 1989. Free cash flow and stockholder gains in going private transactions. *Journal of Finance* 44, 771-787.

Loughran, T. and J. R. Ritter, 1995. The new issues puzzle. *Journal of Finance* 50, 23-51.

Miller, E. M., 1977. Risk, uncertainty and divergence of opinion. *Journal of Finance* 32, 1151-1168.

Pástor, L. and P. Veronesi, 2003. Stock valuation and learning about profitability. *Journal of Finance* 58, 1749-1789.

Pourciau, S., 1993, Earnings management and non-routine executive changes, *Journal of Accounting and Economics* 16, 317-336.

Ritter, J. R. and I. Welch, 2002. A review of IPO activity, pricing and allocations. *Journal of Finance* 57, 1795-1828.

Sim, S. and J. Suh, 2007. Korea discount: Diagnosis and remedy. *Asia-Pacific Journal of Financial Studies* 36, 621-655.

Teoh, S., I. Welch, and T. J. Wong, 1998, Earnings management and the long-run market performance of initial public offerings, *Journal of Finance* 53, 1935–1974.

Zhou, X., 2001. Understanding the determinants of managerial ownership and the link between ownership and performance: comment. *Journal of Financial Economics* 62, 559-571.

**Table 1 Descriptive statistics**

The table reports summary statistics for key variables used in this study. The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. AGE_IPO (our proxy for firm age) is the number of years since the firm's IPO where AGE_IPO = 1 for a firm as of the end of a given year if that firm was listed during that year. MB (our proxy for firm value) is market-to-book at the end of a given fiscal year. The definitions of other variables are provided in Table A1.

| Variable | N | Mean | Min | Lower Quartile | Median | Upper Quartile | Max | Std Dev |
|---|---|---|---|---|---|---|---|---|
| AGE_IPO | 8,234 | 18.844 | 1.000 | 10.000 | 17.000 | 28.000 | 56.000 | 10.983 |
| MB | 8,234 | 0.892 | 0.149 | 0.353 | 0.624 | 1.117 | 3.482 | 0.798 |
| ROE | 8,034 | 0.044 | -0.888 | 0.009 | 0.090 | 0.184 | 0.456 | 0.278 |
| LEVERAGE | 8,234 | 0.154 | 0.000 | 0.042 | 0.103 | 0.207 | 1.000 | 0.170 |
| SIZE | 8,234 | 19.606 | 16.580 | 18.525 | 19.437 | 20.670 | 21.977 | 1.443 |
| RP | 8,234 | 0.012 | 0.000 | 0.000 | 0.002 | 0.015 | 0.072 | 0.019 |
| CAPEX | 7,879 | 0.232 | 0.023 | 0.066 | 0.140 | 0.282 | 1.096 | 0.258 |
| CASH | 8,061 | 0.057 | 0.004 | 0.018 | 0.041 | 0.079 | 0.230 | 0.053 |
| RETURN | 8,234 | 0.136 | -0.696 | -0.276 | 0.008 | 0.403 | 1.714 | 0.595 |
| VOLATILITY | 8,233 | 56.889 | 25.282 | 39.987 | 52.437 | 69.717 | 110.560 | 22.096 |
| DIV_DM | 8,234 | 0.658 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 | 0.475 |

**Table 2 Distribution of sample by year**

The table reports the number of sample firms (N) and the median values of our key variables for each year over the sample period 2000-2011. The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. AGE_IPO (our proxy for firm age) is the number of years since the firm's IPO where AGE_IPO = 1 for a firm as of the end of a given year if that firm was listed during that year. MB (our proxy for firm value) is market-to-book at the end of a given fiscal year. The definitions of other variables are provided in Table A1.

| YEAR | N | AGE_IPO | MB | ROE | LEVERAGE | SIZE | RP | CAPEX | CASH | RETURN | VOLATILITY | DIV_DM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | 678 | 13 | 0.302 | 0.063 | 0.161 | 19.236 | 0.003 | 0.146 | 0.027 | -0.386 | 86.780 | 1.000 |
| 2001 | 675 | 14 | 0.441 | 0.066 | 0.141 | 19.225 | 0.003 | 0.131 | 0.032 | 0.251 | 65.181 | 1.000 |
| 2002 | 676 | 15 | 0.406 | 0.093 | 0.121 | 19.222 | 0.003 | 0.135 | 0.037 | -0.167 | 59.295 | 1.000 |
| 2003 | 670 | 16 | 0.464 | 0.087 | 0.100 | 19.203 | 0.003 | 0.134 | 0.039 | 0.013 | 48.619 | 1.000 |
| 2004 | 663 | 17 | 0.477 | 0.100 | 0.097 | 19.241 | 0.003 | 0.149 | 0.037 | 0.023 | 45.536 | 1.000 |
| 2005 | 660 | 18 | 0.901 | 0.111 | 0.098 | 19.244 | 0.002 | 0.152 | 0.046 | 0.846 | 48.584 | 1.000 |
| 2006 | 673 | 18 | 0.867 | 0.105 | 0.099 | 19.305 | 0.002 | 0.157 | 0.043 | 0.000 | 43.208 | 1.000 |
| 2007 | 681 | 19 | 1.068 | 0.111 | 0.093 | 19.380 | 0.002 | 0.167 | 0.038 | 0.256 | 48.238 | 1.000 |
| 2008 | 703 | 20 | 0.543 | 0.063 | 0.091 | 19.571 | 0.003 | 0.163 | 0.048 | -0.470 | 62.933 | 1.000 |
| 2009 | 704 | 21 | 0.725 | 0.093 | 0.091 | 19.694 | 0.002 | 0.138 | 0.052 | 0.405 | 50.349 | 1.000 |
| 2010 | 716 | 22 | 0.764 | 0.107 | 0.093 | 19.841 | 0.001 | 0.111 | 0.047 | 0.087 | 37.522 | 1.000 |
| 2011 | 735 | 22 | 0.709 | 0.078 | 0.092 | 19.940 | 0.001 | 0.110 | 0.046 | -0.144 | 47.636 | 1.000 |

**Table 3 Variation of key variables across firm age (AGE_IPO) up to 20 years**

The table reports median and mean values (in Panels A and B, respectively) of key variables for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). AGE_IPO = 1 for a firm as of the end of a given year if that firm was listed during that year.AGE_IPO = 1 if the firm got listed during the most recent fiscal year. MB (our proxy for firm value) is market-to-book at the end of a given fiscal year. The definitions of other variables are provided in Table A1. The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. For each variable, the first row reports median (or mean) values for all firms of each age group, while the second and third rows report median (or mean) values for dividend-payers and dividend-non-payers, respectively.

*Panel A: Median of variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MB | 1.08 | 0.86 | 0.94 | 0.89 | 0.76 | 0.68 | 0.65 | 0.64 | 0.71 | 0.72 | 0.66 | 0.57 | 0.53 | 0.50 | 0.48 | 0.52 | 0.55 | 0.71 | 0.74 | 0.66 |
| Div. payers | 1.13 | 0.92 | 0.98 | 0.92 | 0.77 | 0.75 | 0.71 | 0.66 | 0.70 | 0.71 | 0.71 | 0.61 | 0.54 | 0.52 | 0.49 | 0.52 | 0.55 | 0.63 | 0.65 | 0.65 |
| Div. non-payers | 0.88 | 0.73 | 0.88 | 0.82 | 0.72 | 0.55 | 0.44 | 0.53 | 0.73 | 0.83 | 0.49 | 0.40 | 0.52 | 0.47 | 0.48 | 0.50 | 0.55 | 0.93 | 0.99 | 0.71 |
| ROE | 0.16 | 0.14 | 0.13 | 0.11 | 0.12 | 0.12 | 0.11 | 0.12 | 0.12 | 0.13 | 0.10 | 0.10 | 0.07 | 0.09 | 0.08 | 0.08 | 0.07 | 0.09 | 0.06 | 0.08 |
| Div. payers | 0.18 | 0.17 | 0.15 | 0.14 | 0.15 | 0.16 | 0.14 | 0.15 | 0.15 | 0.15 | 0.14 | 0.13 | 0.13 | 0.14 | 0.13 | 0.13 | 0.12 | 0.12 | 0.11 | 0.12 |
| Div. non-payers | 0.02 | 0.00 | 0.00 | -0.03 | -0.09 | -0.11 | -0.08 | 0.01 | -0.02 | 0.01 | -0.03 | -0.01 | -0.14 | -0.02 | -0.06 | -0.07 | -0.08 | -0.03 | -0.03 | -0.08 |
| CAPEX | 0.23 | 0.18 | 0.17 | 0.18 | 0.18 | 0.16 | 0.16 | 0.17 | 0.15 | 0.16 | 0.15 | 0.15 | 0.14 | 0.12 | 0.14 | 0.12 | 0.13 | 0.13 | 0.14 | 0.15 |
| Div. payers | 0.24 | 0.18 | 0.17 | 0.19 | 0.19 | 0.18 | 0.21 | 0.19 | 0.15 | 0.18 | 0.18 | 0.18 | 0.15 | 0.13 | 0.16 | 0.13 | 0.15 | 0.14 | 0.13 | 0.16 |
| Div. non-payers | 0.17 | 0.21 | 0.11 | 0.15 | 0.14 | 0.11 | 0.12 | 0.09 | 0.14 | 0.11 | 0.09 | 0.10 | 0.10 | 0.11 | 0.09 | 0.10 | 0.10 | 0.12 | 0.15 | 0.13 |
| RETURN | -0.13 | -0.02 | 0.05 | -0.02 | -0.04 | -0.01 | 0.01 | 0.01 | 0.12 | 0.01 | 0.08 | -0.09 | -0.09 | -0.04 | -0.03 | 0.00 | 0.08 | 0.09 | 0.06 | -0.05 |
| Div. payers | -0.11 | 0.03 | 0.10 | -0.02 | -0.01 | 0.06 | 0.05 | 0.06 | 0.15 | 0.07 | 0.11 | 0.04 | -0.03 | 0.10 | 0.09 | 0.07 | 0.17 | 0.19 | 0.11 | 0.15 |
| Div. non-payers | -0.29 | -0.14 | -0.07 | -0.02 | -0.23 | -0.24 | -0.28 | -0.15 | -0.05 | -0.13 | 0.03 | -0.27 | -0.25 | -0.20 | -0.28 | -0.19 | -0.09 | -0.11 | -0.04 | -0.32 |
| Volatility | 62.32 | 50.86 | 47.37 | 50.25 | 50.41 | 52.96 | 54.16 | 48.99 | 48.57 | 47.33 | 49.31 | 66.81 | 65.27 | 58.85 | 53.67 | 51.68 | 51.09 | 51.60 | 50.40 | 53.33 |
| Div. payers | 59.47 | 49.09 | 44.54 | 45.00 | 46.05 | 47.75 | 48.18 | 43.27 | 43.05 | 43.02 | 41.61 | 49.42 | 56.36 | 46.99 | 46.59 | 44.06 | 41.45 | 44.63 | 44.12 | 46.89 |
| Div. non-payers | 72.10 | 58.68 | 63.84 | 64.14 | 65.19 | 75.85 | 72.86 | 66.55 | 65.69 | 69.64 | 70.69 | 89.28 | 83.76 | 79.59 | 71.27 | 68.79 | 65.92 | 66.22 | 69.72 | 68.40 |
| Number of firms | 238 | 226 | 195 | 196 | 213 | 214 | 216 | 201 | 187 | 186 | 192 | 266 | 332 | 340 | 340 | 316 | 283 | 255 | 230 | 221 |
| Div. payers | 175 | 172 | 148 | 149 | 157 | 157 | 148 | 134 | 138 | 132 | 121 | 158 | 197 | 193 | 205 | 198 | 171 | 162 | 145 | 139 |
| Div. non-payers | 63 | 54 | 47 | 47 | 56 | 57 | 68 | 67 | 49 | 54 | 71 | 108 | 135 | 147 | 135 | 118 | 112 | 93 | 85 | 82 |

**Table 3 (continued)**

*Panel B: Mean of variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MB | 1.31 | 1.15 | 1.13 | 1.10 | 1.01 | 0.96 | 0.88 | 0.90 | 0.96 | 0.95 | 0.94 | 0.83 | 0.81 | 0.75 | 0.75 | 0.77 | 0.87 | 0.98 | 1.05 | 0.94 |
| Div. payers | 1.33 | 1.18 | 1.13 | 1.07 | 1.00 | 1.00 | 0.94 | 0.88 | 0.95 | 0.92 | 0.91 | 0.85 | 0.76 | 0.72 | 0.68 | 0.70 | 0.76 | 0.87 | 0.90 | 0.88 |
| Div. non-payers | 1.24 | 1.03 | 1.15 | 1.22 | 1.05 | 0.87 | 0.76 | 0.92 | 1.02 | 1.04 | 0.98 | 0.81 | 0.87 | 0.80 | 0.86 | 0.89 | 1.02 | 1.18 | 1.32 | 1.06 |
| ROE | 0.17 | 0.13 | 0.12 | 0.09 | 0.08 | 0.07 | 0.06 | 0.10 | 0.09 | 0.10 | 0.06 | 0.04 | 0.00 | 0.02 | 0.00 | 0.04 | 0.02 | 0.04 | 0.01 | 0.02 |
| Div. payers | 0.19 | 0.17 | 0.17 | 0.15 | 0.17 | 0.16 | 0.17 | 0.17 | 0.16 | 0.17 | 0.16 | 0.16 | 0.15 | 0.16 | 0.15 | 0.14 | 0.15 | 0.14 | 0.12 | 0.14 |
| Div. non-payers | 0.03 | -0.03 | -0.03 | -0.12 | -0.17 | -0.18 | -0.18 | -0.04 | -0.11 | -0.05 | -0.11 | -0.14 | -0.22 | -0.16 | -0.21 | -0.14 | -0.19 | -0.13 | -0.17 | -0.19 |
| CAPEX | 0.32 | 0.26 | 0.24 | 0.26 | 0.26 | 0.26 | 0.26 | 0.23 | 0.25 | 0.24 | 0.23 | 0.23 | 0.22 | 0.23 | 0.23 | 0.21 | 0.23 | 0.26 | 0.27 | 0.26 |
| Div. payers | 0.33 | 0.26 | 0.25 | 0.27 | 0.28 | 0.28 | 0.29 | 0.26 | 0.24 | 0.24 | 0.24 | 0.25 | 0.24 | 0.22 | 0.24 | 0.21 | 0.24 | 0.27 | 0.27 | 0.28 |
| Div. non-payers | 0.27 | 0.27 | 0.19 | 0.24 | 0.22 | 0.21 | 0.19 | 0.18 | 0.28 | 0.22 | 0.21 | 0.20 | 0.20 | 0.24 | 0.21 | 0.20 | 0.22 | 0.24 | 0.28 | 0.23 |
| RETURN | -0.03 | 0.11 | 0.18 | 0.15 | 0.08 | 0.11 | 0.07 | 0.13 | 0.25 | 0.16 | 0.17 | 0.06 | 0.02 | 0.06 | 0.06 | 0.15 | 0.25 | 0.28 | 0.19 | 0.06 |
| Div. payers | 0.01 | 0.17 | 0.21 | 0.16 | 0.11 | 0.17 | 0.17 | 0.17 | 0.30 | 0.21 | 0.21 | 0.19 | 0.12 | 0.19 | 0.19 | 0.24 | 0.36 | 0.38 | 0.24 | 0.22 |
| Div. non-payers | -0.14 | -0.09 | 0.08 | 0.11 | 0.00 | -0.08 | -0.14 | 0.05 | 0.09 | 0.04 | 0.11 | -0.12 | -0.13 | -0.10 | -0.12 | 0.01 | 0.10 | 0.12 | 0.11 | -0.21 |
| Volatility | 67.94 | 53.22 | 51.38 | 54.73 | 55.85 | 56.84 | 57.64 | 53.32 | 51.56 | 52.88 | 57.36 | 67.90 | 67.43 | 62.82 | 58.24 | 55.98 | 54.81 | 54.94 | 54.88 | 57.41 |
| Div. payers | 64.88 | 51.10 | 47.31 | 50.30 | 50.65 | 50.71 | 51.23 | 45.82 | 45.85 | 45.02 | 47.05 | 54.55 | 57.08 | 50.88 | 48.62 | 47.26 | 45.10 | 46.92 | 45.34 | 48.85 |
| Div. non-payers | 76.56 | 59.95 | 64.20 | 68.80 | 70.41 | 73.73 | 71.60 | 68.32 | 67.64 | 72.08 | 74.94 | 87.42 | 82.54 | 78.49 | 72.86 | 70.61 | 69.62 | 68.91 | 71.14 | 71.93 |
| Number of firms | 238 | 226 | 195 | 196 | 213 | 214 | 216 | 201 | 187 | 186 | 192 | 266 | 332 | 340 | 340 | 316 | 283 | 255 | 230 | 221 |
| Div. payers | 175 | 172 | 148 | 149 | 157 | 157 | 148 | 134 | 138 | 132 | 121 | 158 | 197 | 193 | 205 | 198 | 171 | 162 | 145 | 139 |
| Div. non-payers | 63 | 54 | 47 | 47 | 56 | 57 | 68 | 67 | 49 | 54 | 71 | 108 | 135 | 147 | 135 | 118 | 112 | 93 | 85 | 82 |

**Table 4 Correlation matrix**

The table reports correlations among key variables used in this study. The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. The definitions of these variables are provided in Table A1.

| Variable | AGE_IPO | Log(MB) | ROE | LEVERAGE | SIZE | RP | CAPEX | CASH | RETURN | VOLATILITY | DIV_DM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AGE_IPO | 1 | -0.098 | -0.048 | 0.053 | 0.196 | -0.051 | -0.057 | -0.097 | 0.042 | -0.094 | -0.022 |
| Log(MB) | | 1 | 0.003 | -0.062 | 0.015 | 0.057 | 0.073 | 0.140 | 0.255 | 0.086 | -0.079 |
| ROE | | | 1 | -0.151 | 0.236 | 0.074 | 0.017 | 0.117 | 0.274 | -0.370 | 0.491 |
| LEVERAGE | | | | 1 | 0.080 | -0.132 | -0.091 | -0.124 | -0.051 | 0.313 | -0.273 |
| SIZE | | | | | 1 | -0.054 | 0.008 | -0.041 | 0.084 | -0.301 | 0.264 |
| RP | | | | | | 1 | 0.054 | 0.078 | -0.023 | -0.154 | 0.155 |
| CAPEX | | | | | | | 1 | 0.021 | 0.029 | 0.041 | 0.035 |
| CASH | | | | | | | | 1 | 0.039 | -0.044 | 0.067 |
| RETURN | | | | | | | | | 1 | -0.089 | 0.170 |
| VOLATILITY | | | | | | | | | | 1 | -0.479 |
| DIV_DM | | | | | | | | | | | 1 |

**Table 5 Regressions of firm value on age**

The table reports results of the regressions that estimate the impact of firm age (i.e., the number of years since the firm's listing (AGE_IPO) on firm value (i.e., the logarithm of market-to-book (log(MB)) along with other determinants of firm value. The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. Panel A reports OLS regression results that control for year fixed effects. The numbers in the parentheses in this panel are t-values based on firm-clustered standard errors. Panel B reports results obtained using the Fama-MacBeth two-step regressions. That is, the reported coefficients are the averages of coefficients estimated from year-by-year cross-sectional regressions; t-values are calculated based on those coefficients from year-by-year regressions; Adj. $R^2$ are the averages of adjusted R squared from year-by-year regressions; and N are the average numbers of firm-year observations for year-by-year regressions. The definitions of the variables in these regressions are provided in Table A1. *, ** and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

*Panel A: OLS regressions*

| | Dependent variable: Log(MB) | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Intercept | -0.113*** | -0.483* | -0.488* | -0.528* | -0.705** |
| | (-2.61) | (-1.77) | (-1.75) | (-1.85) | (-2.43) |
| $AGE\_IPO_t$ | -0.009*** | -0.009*** | -0.008*** | -0.008*** | -0.007*** |
| | (-5.51) | (-5.20) | (-4.62) | (-4.14) | (-3.75) |
| $DIV\_DM_t$ | | -0.245*** | -0.270*** | -0.293*** | -0.317*** |
| | | (-6.60) | (-6.91) | (-7.43) | (-7.84) |
| $LEVERAGE_t$ | | -0.234* | -0.200 | -0.179 | -0.155 |
| | | (-1.87) | (-1.54) | (-1.33) | (-1.10) |
| $SIZE_t$ | | 0.028* | 0.032** | 0.032*** | 0.036** |
| | | (1.95) | (2.16) | (2.13) | (2.34) |
| $ROE_t$ | | 0.049 | 0.046 | 0.061 | 0.080 |
| | | (0.76) | (0.84) | (1.10) | (1.37) |
| $ROE_{t+1}$ | | | 0.234*** | 0.218*** | 0.218*** |
| | | | (3.58) | (3.49) | (3.40) |
| $ROE_{t+2}$ | | | | 0.273*** | 0.260*** |
| | | | | (4.83) | (4.82) |
| $ROE_{t+3}$ | | | | | 0.243*** |
| | | | | | (3.94) |
| $RETURN_{t+1}$ | | | -0.273*** | -0.297*** | -0.321*** |
| | | | (-15.75) | (-15.45) | (-15.26) |
| $RETURN_{t+2}$ | | | | -0.255*** | -0.293*** |
| | | | | (-13.57) | (-14.81) |
| $RETURN_{t+3}$ | | | | | -0.216*** |
| | | | | | (-10.23) |

| | | | | | |
|---|---|---|---|---|---|
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.158 | 0.173 | 0.214 | 0.250 | 0.288 |
| N | 7,984 | 7,785 | 6,964 | 6,166 | 5,396 |

*Panel B: Fama and MacBeth (1973) regression*

| | Dependent variable: Log(MB) | | | | |
|---|---|---|---|---|---|
| | (6) | (7) | (8) | (9) | (10) |
| Intercept | -0.216* | -0.603** | -0.652** | -0.603** | -0.668*** |
| | (-2.05) | (-2.30) | (-2.86) | (-2.96) | (-3.47) |
| $AGE\_IPO_t$ | -0.009*** | -0.009*** | -0.009*** | -0.008*** | -0.007*** |
| | (-6.65) | (-9.30) | (-9.48) | (-10.69) | (-11.91) |
| $DIV\_DM_t$ | | -0.256*** | -0.273*** | -0.293*** | -0.309*** |
| | | (-7.15) | (-8.42) | (-8.10) | (-8.66) |
| $LEVERAGE_t$ | | -0.258*** | -0.228*** | -0.208*** | -0.145* |
| | | (-10.54) | (-10.74) | (-5.05) | (-2.16) |
| $SIZE_t$ | | 0.030 | 0.033* | 0.032 | 0.036* |
| | | (1.62) | (1.90) | (1.83) | (2.20) |
| $ROE_t$ | | 0.054 | -0.011 | -0.003 | 0.026 |
| | | (0.68) | (-0.24) | (-0.06) | (0.42) |
| $ROE_{t+1}$ | | | 0.292** | 0.277** | 0.270*** |
| | | | (2.78) | (2.74) | (3.78) |
| $ROE_{t+1}$ | | | | 0.289*** | 0.296*** |
| | | | | (4.98) | (4.66) |
| $ROE_{t+3}$ | | | | | 0.221*** |
| | | | | | (6.16) |
| $RETURN_{t+1}$ | | | -0.271*** | -0.306*** | -0.335*** |
| | | | (-7.03) | (-7.49) | (-9.34) |
| $RETURN_{t+2}$ | | | | -0.244*** | -0.291*** |
| | | | | (-6.07) | (-8.12) |
| $RETURN_{t+3}$ | | | | | -0.212*** |
| | | | | | (-4.46) |
| Adj. $R^2$ | 0.022 | 0.053 | 0.090 | 0.125 | 0.159 |
| N | 7,984 | 7,785 | 6,964 | 6,166 | 5,396 |

**Table 6 Regression of firm value on age for dividend-payers and dividend-non-payers**

For two groups of firms, dividend-payers and dividend-non-payers, the table reports results of the regressions that estimate the impact of firm age (i.e., the number of years since the firm's listing (AGE_IPO)) on firm value (i.e., the logarithm of market-to-book (log(MB)) along with other determinants of firm value. The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. Panel A reports OLS regression results that control for year fixed effects. The numbers in the parentheses in this panel are t-values based on firm-clustered standard errors. Panel B reports results obtained using the Fama-MacBeth two-step regressions. That is, the reported coefficients are the averages of coefficients estimated from year-by-year cross-sectional regressions; t-values are calculated based on those coefficients from year-by-year regressions; Adj. $R^2$ are the averages of adjusted R squared from year-by-year regressions; and N are the average numbers of firm-year observations for year-by-year regressions. In both Panels, Columns (1) and (2) examine dividend-payers; Columns (3) and (4) examine dividend-non-payers. The definitions of these variables are provided in Table A1. *, ** and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

*Panel A. OLS regressions*

| | Dependent variable: Log(MB) | | | |
|---|---|---|---|---|
| | Dividend payers | | Dividend non-payers | |
| | (1) | (2) | (3) | (4) |
| Intercept | -0.094* | -2.358*** | -0.148* | 1.253*** |
| | (-1.89) | (-8.11) | (-1.88) | (2.82) |
| $AGE\_IPO_t$ | -0.012*** | -0.007*** | -0.004 | 0.002 |
| | (-6.19) | (-3.96) | (-1.33) | (0.44) |
| $LEVERAGE_t$ | | -0.362** | | -0.015 |
| | | (-2.46) | | (-0.08) |
| $SIZE_t$ | | 0.096*** | | -0.088*** |
| | | (6.19) | | (-3.64) |
| $ROE_t$ | | 1.216*** | | -0.240*** |
| | | (9.69) | | (-4.25) |
| $ROE_{t+1}$ | | 0.746*** | | -0.017 |
| | | (8.50) | | (-0.25) |
| $ROE_{t+2}$ | | 0.466*** | | 0.126* |
| | | (6.15) | | (1.88) |
| $ROE_{t+3}$ | | 0.423*** | | 0.081 |
| | | (5.67) | | (1.15) |
| $RETURN_{t+1}$ | | -0.381*** | | -0.234*** |
| | | (-18.10) | | (-6.73) |
| $RETURN_{t+2}$ | | -0.277*** | | -0.238*** |
| | | (-13.19) | | (-7.15) |
| $RETURN_{t+3}$ | | -0.227*** | | -0.133*** |

| | | | | |
|---|---|---|---|---|
| | | (-11.27) | | (-3.84) |
| Year FE | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.208 | 0.503 | 0.122 | 0.253 |
| N | 5,414 | 3,719 | 2,570 | 1,677 |

*Panel B. Fama and MacBeth (1973) regressions*

| | Dependent variable: Log(MB) | | | |
|---|---|---|---|---|
| | Dividend payers | | Dividend non-payers | |
| | (5) | (6) | (7) | (8) |
| Intercept | -0.226* | -2.284*** | -0.197* | 1.436*** |
| | (-1.97) | (-10.90) | (-1.96) | (6.32) |
| $AGE\_IPO_t$ | -0.012*** | -0.007*** | -0.004** | 0.002 |
| | (-8.16) | (-4.28) | (-2.54) | (1.28) |
| $LEVERAGE_t$ | | -0.401** | | 0.150 |
| | | (-2.68) | | (0.71) |
| $SIZE_t$ | | 0.090*** | | -0.092*** |
| | | (10.86) | | (-6.91) |
| $ROE_t$ | | 1.088*** | | -0.275*** |
| | | (7.34) | | (-5.02) |
| $ROE_{t+1}$ | | 0.820*** | | 0.067 |
| | | (7.98) | | (0.94) |
| $ROE_{t+2}$ | | 0.602*** | | 0.168** |
| | | (4.44) | | (3.29) |
| $ROE_{t+3}$ | | 0.473*** | | 0.053 |
| | | (3.59) | | (1.86) |
| $RETURN_{t+1}$ | | -0.426*** | | -0.284*** |
| | | (-13.27) | | (-4.96) |
| $RETURN_{t+2}$ | | -0.260*** | | -0.259*** |
| | | (-5.71) | | (-7.12) |
| $RETURN_{t+3}$ | | -0.204*** | | -0.157*** |
| | | (-4.38) | | (-4.14) |
| Adj. $R^2$ | 0.047 | 0.395 | 0.001 | 0.127 |
| N | 5,414 | 3,719 | 2,570 | 1,677 |

**Table 7 Regressions of firm value on age with an extended sample period 1981–2011**

The table reports results of the regressions that estimate the impact of firm age (i.e., the number of years since the firm's listing (AGE_IPO) on firm value (i.e., the logarithm of market-to-book (log(MB)). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 1981-2011. Panels A and B use OLS regressions and Fama-MacBeth two step regressions, respectively. Each panel reports results for three groups of firms: (i) all sample firms, (ii) dividend-payers and (ii) dividend-non-payers, respectively. The numbers in the parentheses in Panel A are t-values based on firm-clustered standard errors; those in Panel B are regular t-values. The definitions of the variables in these regressions are provided in Table A1. *, ** and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

*Panel A. OLS regressions*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.107*** | 0.285 | 0.212 | -0.064 | -0.694*** | -0.148** | 0.717*** |
| | (-2.77) | (1.43) | (1.08) | (-1.41) | (-2.71) | (-2.29) | (3.24) |
| $AGE\_IPO_t$ | -0.009*** | -0.007*** | -0.002 | -0.013*** | -0.009*** | -0.004** | 0.000 |
| | (-6.69) | (-3.95) | (-0.75) | (-7.83) | (-5.18) | (-2.01) | (-0.03) |
| $DIV\_DM_t$ | | -0.166*** | -0.020 | | | | |
| | | (-5.68) | (-0.44) | | | | |
| $AGE \times DIV_t$ | | | -0.008*** | | | | |
| | | | (-3.60) | | | | |
| $LEVERAGE_t$ | | -0.001 | 0.009 | | 0.080 | | -0.087 |
| | | (-0.02) | (0.10) | | (0.63) | | (-0.90) |
| $SIZE_t$ | | -0.021** | -0.022** | | 0.014 | | -0.058*** |
| | | (-2.02) | (-2.10) | | (1.06) | | (-4.77) |
| $ROE_t$ | | -0.081** | -0.084** | | 0.952*** | | -0.342*** |
| | | (-2.01) | (-2.07) | | (9.23) | | (-8.80) |
| $ROE_{t+1}$ | | 0.306*** | 0.304*** | | 0.577*** | | 0.164*** |
| | | (8.70) | (8.61) | | (9.70) | | (4.10) |
| $ROE_{t+2}$ | | 0.223*** | 0.221*** | | 0.322*** | | 0.157*** |
| | | (8.02) | (7.95) | | (7.34) | | (4.55) |
| $ROE_{t+3}$ | | 0.158*** | 0.158*** | | 0.219*** | | 0.079** |
| | | (5.46) | (5.49) | | (5.43) | | (2.22) |
| $RETURN_{t+1}$ | | -0.283*** | -0.282*** | | -0.293*** | | -0.266*** |
| | | (-22.05) | (-22.07) | | (-18.54) | | (-14.11) |
| $RETURN_{t+2}$ | | -0.238*** | -0.237*** | | -0.223*** | | -0.250*** |
| | | (-20.69) | (-20.59) | | (-13.87) | | (-15.37) |
| $RETURN_{t+3}$ | | -0.145*** | -0.145*** | | -0.131*** | | -0.157*** |
| | | (-12.26) | (-12.26) | | (-8.94) | | (-8.90) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.249 | 0.343 | 0.345 | 0.265 | 0.431 | 0.261 | 0.359 |
| N | 17,235 | 13,525 | 13,525 | 8,655 | 6,656 | 8,580 | 6,869 |

*Panel B. Fama and MacBeth (1973) regressions*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.177 | 0.309 | 0.267 | -0.098 | -0.473 | -0.177 | 1.248** |
| | (-1.69) | (0.71) | (0.60) | (-0.94) | (-0.53) | (-1.55) | (2.57) |
| $AGE\_IPO_t$ | -0.008*** | -0.004*** | -0.002 | -0.014*** | -0.008*** | -0.005** | -0.000 |
| | (-3.58) | (-2.10) | (-1.20) | (-7.58) | (-5.29) | (-2.63) | (-0.04) |
| $DIV\_DM_t$ | | -0.112 | -0.056 | | | | |
| | | (-1.98) | (-1.18) | | | | |
| $AGE \times DIV_t$ | | | -0.003*** | | | | |
| | | | (-2.11) | | | | |
| $LEVERAGE_t$ | | -0.122 | -0.119 | | -0.168 | | -0.077 |
| | | (-1.39) | (-1.36) | | (-0.91) | | (-0.75) |
| $SIZE_t$ | | -0.020 | -0.020 | | 0.006 | | -0.076*** |
| | | (-0.81) | (-0.81) | | (0.14) | | (-2.90) |
| $ROE_t$ | | -0.162** | -0.164** | | 0.810*** | | -0.363*** |
| | | (-2.36) | (-2.40) | | -5.25 | | (-4.75) |
| $ROE_{t+1}$ | | 0.323*** | 0.323*** | | 0.722*** | | 0.210** |
| | | (5.40) | (5.39) | | (6.14) | | (2.48) |
| $ROE_{t+2}$ | | 0.262*** | 0.261*** | | 0.405*** | | 0.207*** |
| | | (5.23) | (5.18) | | (3.10) | | (4.07) |
| $ROE_{t+3}$ | | 0.166*** | 0.164*** | | 0.203 | | 0.090*** |
| | | (5.85) | (5.85) | | (1.17) | | (3.22) |
| $RETURN_{t+1}$ | | -0.303*** | -0.302*** | | -0.355*** | | -0.304*** |
| | | (-6.80) | (-6.76) | | (-5.97) | | (-8.13) |
| $RETURN_{t+2}$ | | -0.261*** | -0.260*** | | -0.208*** | | -0.276*** |
| | | (-4.93) | (-4.90) | | (-4.98) | | (-5.71) |
| $RETURN_{t+3}$ | | -0.165*** | -0.165*** | | -0.140*** | | -0.156*** |
| | | (-3.60) | (-3.60) | | (-3.21) | | (-3.62) |
| Adj. $R^2$ | 0.021 | 0.167 | 0.168 | 0.056 | 0.307 | 0.008 | 0.173 |
| N | 17,235 | 13,525 | 13,525 | 8,655 | 6,656 | 8,580 | 6,869 |

**Table 8 Additional robustness checks for an extended period 1981-2011**

The table reports a variety of robustness checks on the impact of firm age (i.e., the number of years since the firm's listing (AGE_IPO) on firm value (i.e., the logarithm of market-to-book (log(MB)) for an extended sample period 1981-2011. In Panel A, the sample includes only those firms that are older than 5 years (i.e., AGE_IPO > 5). In Panel B, the sample includes only those firms that are active as of the end of 2011 (in other words, it excludes those firms that exited the market during the sample period). In Panels C and D, the samples consist of chaebol-affiliated firms and non-chaebol-affiliated firms, respectively. We determine a firm to be affiliated with a chaebol if the Korea Fair Trade Commission classifies the firm as such in December 2005. In Panel E, regressions control for industry fixed effects where industry is defined based on the KSIC 5 digit level. In Panel F, regressions control for IPO cohorts (i.e., firms that are listed in the same fiscal year) by including IPO-year fixed effects; firms that are listed in a given fiscal year receive the value of 1 for the dummy variable assigned to that fiscal year and zero otherwise. In Panel G, the regressions control for firm fixed effects. In each panel, when control variables are added, these variables include $LEVERAGE_t$, $SIZE_t$, $ROE_t$, $ROE_{t+1}$, $ROE_{t+2}$, $ROE_{t+3}$, $RETURN_{t+1}$, $RETURN_{t+2}$, and $RETURN_{t+3}$. All regressions in this table control for year fixed effects. The numbers in the parentheses are t-values based on firm-clustered standard errors. The definitions of the variables in these regressions are provided in Table A1. *, ** and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

*Panel A. Firms older than 5 (i.e, AGE_IPO > 5)*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.210*** | 0.290 | 0.216 | -0.210*** | -0.754*** | -0.187** | 0.825*** |
| | (-4.13) | (1.27) | (0.97) | (-3.57) | (-2.65) | (-2.18) | (3.25) |
| $AGE\_IPO_t$ | -0.006*** | -0.004* | 0.001 | -0.008*** | -0.006*** | -0.003 | 0.003 |
| | (-3.53) | (-1.72) | (0.29) | (-3.96) | (-2.75) | (-1.07) | (1.11) |
| $DIV\_DM_t$ | | -0.185*** | -0.055 | | | | |
| | | (-5.90) | (-0.89) | | | | |
| $AGE \times DIV_t$ | | | -0.007** | | | | |
| | | | (-2.28) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.237 | 0.336 | 0.337 | 0.264 | 0.442 | 0.243 | 0.345 |
| N | 13,855 | 11,229 | 11,229 | 7,180 | 5,687 | 6,675 | 5,542 |

*Panel B. Active firms as of 2011*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.099** | 0.097 | 0.003 | -0.077 | -1.069*** | -0.133* | 0.799*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (-2.37) | (0.38) | (0.01) | (-1.62) | (-3.68) | (-1.89) | (2.64) |
| $AGE\_IPO_t$ | -0.010*** | -0.007*** | -0.003 | -0.013*** | -0.009*** | -0.004 | -0.002 |
| | (-6.11) | (-3.85) | (-1.04) | (-6.92) | (-4.55) | (-1.93) | (-0.6) |
| $DIV\_DM_t$ | | -0.177*** | -0.053 | | | | |
| | | (-5.28) | (-0.98) | | | | |
| $AGE \times DIV_t$ | | | -0.007*** | | | | |
| | | | (-2.63) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.248 | 0.350 | 0.352 | 0.259 | 0.445 | 0.258 | 0.363 |
| N | 13,517 | 10,785 | 10,785 | 7,612 | 5,909 | 5,905 | 4,876 |

*Panel C. Chaebol affiliated firms*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | 0.128 | 0.216 | 0.209 | 0.149 | -1.081 | 0.081 | 1.034 |
| | (1.39) | (0.33) | (0.32) | (1.35) | (-1.48) | (0.53) | (1.45) |
| $AGE\_IPO_t$ | -0.012*** | -0.009*** | -0.009* | -0.013*** | -0.009** | -0.009** | -0.007 |
| | (-3.88) | (-2.76) | (-1.88) | (-3.61) | (-2.28) | (-2.19) | (-1.60) |
| $DIV\_DM_t$ | | -0.243*** | -0.229* | | | | |
| | | (-3.11) | (-1.72) | | | | |
| $AGE \times DIV_t$ | | | -0.001 | | | | |
| | | | (-0.13) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.272 | 0.410 | 0.410 | 0.252 | 0.465 | 0.323 | 0.433 |
| N | 3,220 | 2,587 | 2,587 | 1,870 | 1,438 | 1,350 | 1,149 |

*Panel D. Non-chaebol affiliated firms*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.161*** | 0.798*** | 0.716*** | -0.119** | -0.058 | -0.187*** | 0.967*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (-3.79) | (3.52) | (3.23) | (-2.41) | (-0.19) | (-2.64) | (3.83) |
| $AGE\_IPO_t$ | -0.009*** | -0.005*** | 0.001 | -0.014*** | -0.008*** | -0.003 | 0.002 |
| | (-5.75) | (-2.68) | (0.55) | (-7.21) | (-4.12) | (-1.35) | (0.62) |
| $DIV\_DM_t$ | | -0.151*** | (0.033 | | | | |
| | | (-4.83) | (0.68) | | | | |
| $AGE \times DIV_t$ | | | -0.011*** | | | | |
| | | | (-4.23) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.251 | 0.354 | 0.358 | 0.293 | 0.445 | 0.255 | 0.361 |
| N | 14,015 | 10,938 | 10,938 | 6,785 | 5,218 | 7,230 | 5,720 |

*Panel E. Regressions with industry fixed effects*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.124*** | 0.729*** | 0.638** | -0.282*** | -0.122 | -0.154*** | 1.175*** |
| | (-3.39) | (2.88) | (2.53) | (-5.83) | (-0.38) | (-2.64) | (3.62) |
| $AGE\_IPO_t$ | -0.005*** | -0.003* | 0.001 | -0.009*** | -0.006*** | 0.001 | 0.002 |
| | (-3.43) | (-1.90) | (0.39) | (-4.52) | (-3.03) | (0.34) | (0.80) |
| $DIV\_DM_t$ | | -0.097*** | 0.012 | | | | |
| | | (-3.69) | (0.30) | | | | |
| $AGE \times DIV_t$ | | | -0.006*** | | | | |
| | | | (-3.26) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.411 | 0.510 | 0.511 | 0.484 | 0.617 | 0.422 | 0.520 |
| N | 17,235 | 13,525 | 13,525 | 8,655 | 6,656 | 8,580 | 6,869 |

*Panel F: IPO cohort fixed effects*

| | All firms | | | Dividend-payers | | Dividend-non-payers | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | 0.257 | 1.463*** | 1.400*** | 0.349** | -0.310 | 0.023 | 2.939*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1.88) | (3.40) | (3.17) | (2.45) | (-0.69) | (0.07) | (5.66) |
| $AGE\_IPO_t$ | -0.117*** | -0.497*** | -0.493*** | -0.129*** | -0.398*** | -0.096** | -0.666*** |
| | (-7.92) | (-26.75) | (-26.18) | (-7.30) | (-17.52) | (-2.05) | (-12.47) |
| $DIV\_DM_t$ | | -0.156*** | -0.055 | | | | |
| | | (-5.29) | (-1.15) | | | | |
| $AGE \times DIV_t$ | | | -0.006** | | | | |
| | | | (-2.41) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| IPO-year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.269 | 0.365 | 0.366 | 0.302 | 0.457 | 0.280 | 0.385 |
| N | 17,235 | 13,525 | 13,525 | 8,655 | 6,656 | 8,580 | 6,869 |

*Panel G. Regressions with firm fixed effects*

| | Dependent variable: Log(MB) | | | | | | |
|---|---|---|---|---|---|---|---|
| | All firms | | | Dividend-payers | | Dividend-non-payers | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Intercept | -0.477 | 6.542*** | 6.341*** | 0.461 | 5.717*** | -0.513 | 6.305*** |
| | (-0.95) | (13.44) | (13.00) | (1.09) | (11.91) | (-0.96) | (11.49) |
| $AGE\_IPO_t$ | -0.115*** | -0.432*** | -0.429*** | -0.128*** | -0.339*** | -0.079 | -0.520*** |
| | (-4.32) | (-16.38) | (-16.27) | (-4.82) | (-13.62) | (-1.45) | (-9.71) |
| $DIV\_DM_t$ | | -0.002*** | 0.089*** | | | | |
| | | (-0.15) | (3.84) | | | | |
| $AGE \times DIV_t$ | | | -0.005*** | | | | |
| | | | (-4.86) | | | | |
| Control vars. | No | Yes | Yes | No | Yes | No | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.544 | 0.653 | 0.653 | 0.672 | 0.792 | 0.543 | 0.654 |
| N | 18,201 | 18,201 | 18,201 | 8,702 | 8,702 | 9,499 | 9,499 |

**Table 9 Firm value and profitability in the pre- and post-IPO years (AGE_IPO =-10 to AGE_IPO=10) over 1981-2011**

The table reports median and mean values of firm value (measured by market-to-book) in Panel A, operating rate of return in Panel B, return on equity in Panel C, total accruals in Panel D and unexpected total accruals in Panel E, respectively, for groups of firms of the same age. The sample includes firms for which firm value is available for the period 1981-2011. Age is measured by the number of years since the firm's listing (i.e., AGE_IPO); AGE_IPO = 1 if the firm got listed during the most recent fiscal year; AGE_IPO = 0 represents the last year before IPO issuance; AGE = -1 is the two years before IPO issuance; and so on. The definitions of other variables are provided in Table A1. For each variable, the first row reports median (or mean) values for all firms of each age group, while the second and third rows report median (or mean) values for dividend-payers and dividend-non-payers, respectively.

*Panel A. Market-to-book ratio*

| | | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All firms | Mean | 0.76 | 0.84 | 1.24 | 1.39 | 1.24 | 1.09 | 1.23 | 1.55 | 1.43 | 1.42 | 1.36 | 1.31 | 1.07 | 1.19 | 1.20 | 1.14 | 1.06 | 1.05 | 1.25 | 1.28 | 0.99 |
| | Median | 0.47 | 0.64 | 0.80 | 0.96 | 0.91 | 0.82 | 1.02 | 1.02 | 1.03 | 1.05 | 0.87 | 0.95 | 0.72 | 0.93 | 1.05 | 0.81 | 0.68 | 0.81 | 0.93 | 0.83 | 0.71 |
| Div. payers | Mean | 0.96 | 1.27 | 1.91 | 1.63 | 1.47 | 1.56 | 1.30 | 1.65 | 1.33 | 1.31 | 1.26 | 1.26 | 1.03 | 1.10 | 1.23 | 1.14 | 1.14 | 1.12 | 1.27 | 1.43 | 1.08 |
| | Median | 0.96 | 1.16 | 1.57 | 1.74 | 1.06 | 1.25 | 0.98 | 1.08 | 0.93 | 0.96 | 0.85 | 0.95 | 0.74 | 0.88 | 1.04 | 0.81 | 0.70 | 0.88 | 0.89 | 1.20 | 0.71 |
| Div. non-payers | Mean | 0.68 | 0.50 | 0.58 | 1.00 | 0.85 | 0.62 | 1.11 | 1.32 | 1.95 | 1.87 | 2.13 | 1.63 | 1.25 | 1.61 | 1.06 | 1.16 | 0.70 | 0.27 | 1.15 | 0.64 | 0.72 |
| | Median | 0.28 | 0.39 | 0.55 | 0.42 | 0.49 | 0.45 | 1.05 | 0.87 | 1.43 | 1.82 | 2.54 | 0.97 | 0.54 | 1.01 | 1.20 | 1.02 | 0.68 | 0.27 | 1.03 | 0.67 | 0.72 |
| Number of firms | | 7 | 9 | 10 | 13 | 16 | 20 | 26 | 32 | 39 | 42 | 42 | 44 | 42 | 39 | 36 | 31 | 27 | 24 | 23 | 21 | 15 |
| Div. payers | | 2 | 4 | 5 | 8 | 10 | 10 | 17 | 22 | 33 | 34 | 37 | 38 | 34 | 32 | 29 | 25 | 22 | 22 | 18 | 17 | 11 |
| Div. non-payers | | 5 | 5 | 5 | 5 | 6 | 10 | 9 | 10 | 6 | 8 | 5 | 6 | 8 | 7 | 7 | 6 | 5 | 2 | 5 | 4 | 4 |

*Panel B. Operating rate of return (%) ( = operating income before depreciation / total assets)*

| | | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All firms | Mean | 8.79 | 9.01 | 10.63 | 8.88 | 8.52 | 8.45 | 6.72 | 9.32 | 10.40 | 10.94 | 11.75 | 9.52 | 8.33 | 7.57 | 7.70 | 6.71 | 7.10 | 7.18 | 7.80 | 7.23 | 6.26 |
| | Median | 6.14 | 7.91 | 7.86 | 7.68 | 7.84 | 9.69 | 5.70 | 9.71 | 10.20 | 10.98 | 11.69 | 9.28 | 7.27 | 6.16 | 7.05 | 6.53 | 7.78 | 6.40 | 7.79 | 7.60 | 5.88 |
| Div. payers | Mean | 10.91 | 10.47 | 13.28 | 10.89 | 11.94 | 12.85 | 10.20 | 11.18 | 10.27 | 10.66 | 11.10 | 10.20 | 9.29 | 7.34 | 8.24 | 6.91 | 8.35 | 7.76 | 9.85 | 9.45 | 9.76 |
| | Median | 10.91 | 9.64 | 17.21 | 8.91 | 13.79 | 12.86 | 10.28 | 11.72 | 10.03 | 10.10 | 10.99 | 9.64 | 8.28 | 6.11 | 7.07 | 6.53 | 8.38 | 6.83 | 9.32 | 10.31 | 8.46 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Div. non-payers | Mean | 7.93 | 7.84 | 7.32 | 4.85 | 1.66 | 4.05 | -0.68 | 4.78 | 11.24 | 12.23 | 16.43 | 5.46 | 4.48 | 8.59 | 5.47 | 5.91 | 1.60 | 0.86 | 0.43 | -2.21 | -3.36 |
| | Median | 6.14 | 7.91 | 6.53 | 6.68 | 4.24 | 3.00 | 1.66 | 4.53 | 10.41 | 11.93 | 17.69 | 0.60 | 2.08 | 6.21 | 6.37 | 5.09 | 1.99 | 0.86 | 0.75 | -0.39 | -1.59 |
| Number of firms | | 7 | 9 | 9 | 12 | 15 | 20 | 25 | 31 | 38 | 40 | 41 | 42 | 40 | 38 | 36 | 31 | 27 | 24 | 23 | 21 | 15 |
| Div. payers | | 2 | 4 | 5 | 8 | 10 | 10 | 17 | 22 | 33 | 33 | 36 | 36 | 32 | 31 | 29 | 25 | 22 | 22 | 18 | 17 | 11 |
| Div. non-payers | | 5 | 5 | 4 | 4 | 5 | 10 | 8 | 9 | 5 | 7 | 5 | 6 | 8 | 7 | 7 | 6 | 5 | 2 | 5 | 4 | 4 |

*Panel C. Return on equity (= income before extraordinary items / 1-year lagged book equity)*

| | | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All firms | Mean | -26.0 | 4.9 | 31.4 | 7.1 | 15.3 | 10.9 | 5.9 | 20.9 | 22.8 | 22.7 | 27.5 | 18.3 | 15.3 | 14.4 | 11.1 | 14.3 | 15.3 | 14.8 | 16.3 | 11.7 | 8.1 |
| | Median | -17.4 | 35.3 | 40.0 | 15.0 | 24.3 | 14.8 | 12.8 | 17.4 | 21.3 | 17.5 | 29.1 | 16.7 | 15.7 | 12.6 | 12.8 | 13.6 | 14.8 | 11.3 | 13.4 | 13.5 | 9.7 |
| Div. payers | Mean | 5.6 | 42.2 | 31.1 | 21.0 | 30.6 | 22.4 | 23.3 | 21.7 | 22.5 | 21.3 | 25.7 | 20.8 | 17.3 | 15.2 | 15.7 | 16.6 | 16.9 | 16.3 | 20.5 | 17.4 | 20.7 |
| | Median | 5.6 | 45.6 | 33.3 | 15.0 | 35.4 | 22.7 | 24.6 | 18.4 | 19.5 | 16.9 | 22.9 | 17.6 | 16.1 | 13.6 | 13.3 | 14.4 | 15.3 | 11.8 | 18.5 | 15.8 | 17.2 |
| Div. non-payers | Mean | -32.4 | -23.0 | 31.7 | -13.8 | -5.2 | 2.0 | -24.0 | 19.5 | 24.3 | 28.2 | 40.6 | 2.7 | 6.8 | 11.0 | -8.3 | 4.3 | 8.3 | -1.3 | 1.0 | -12.4 | -26.5 |
| | Median | -23.3 | -24.5 | 40.0 | 5.8 | -7.2 | 7.4 | -13.4 | 17.0 | 25.0 | 29.9 | 45.6 | -3.2 | 0.1 | 7.4 | 1.9 | 3.3 | 2.6 | -1.3 | 0.6 | -6.9 | -24.0 |
| Number of firms | | 7 | 9 | 10 | 13 | 16 | 20 | 26 | 32 | 39 | 42 | 42 | 44 | 42 | 39 | 36 | 31 | 27 | 24 | 23 | 21 | 15 |
| Div. payers | | 2 | 4 | 5 | 8 | 10 | 10 | 17 | 22 | 33 | 34 | 37 | 38 | 34 | 32 | 29 | 25 | 22 | 22 | 18 | 17 | 11 |
| Div. non-payers | | 5 | 5 | 5 | 5 | 6 | 10 | 9 | 10 | 6 | 8 | 5 | 6 | 8 | 7 | 7 | 6 | 5 | 2 | 5 | 4 | 4 |

*Panel D. Total accruals (%)*

| | | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All firms | Mean | -9.39 | -2.45 | -2.98 | -6.05 | -4.21 | -6.99 | -6.59 | -3.77 | -2.41 | -6.39 | -4.22 | 0.22 | -4.96 | -3.40 | -4.54 | -1.27 | -3.04 | -3.47 | -0.79 | -5.74 | -1.98 |
| | Median | -7.40 | -1.58 | -2.18 | -4.55 | -4.39 | -7.82 | -4.33 | -1.86 | -2.92 | -4.16 | -2.51 | -0.92 | -2.28 | -3.70 | -3.91 | -1.15 | -1.58 | -1.02 | -3.46 | -2.88 | -1.24 |
| Div. payers | Mean | -8.60 | 3.46 | 0.21 | 1.58 | 1.63 | -3.47 | -4.92 | 0.07 | -0.91 | -6.71 | -3.73 | -1.04 | -5.22 | -2.32 | -1.18 | -0.99 | -2.01 | -3.35 | -0.34 | -5.09 | 0.61 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Median | -8.60 | 3.04 | -1.65 | -0.19 | -2.13 | -2.16 | -4.24 | -1.16 | -1.59 | -3.79 | -2.31 | -1.05 | -3.78 | -3.43 | -3.06 | 0.09 | -1.85 | -1.02 | -2.27 | -2.52 | -0.65 |
| Div. non-payers | Mean | -9.71 | -8.36 | -6.81 | -19.77 | -13.95 | -10.50 | -9.74 | -11.83 | -10.40 | -5.04 | -7.65 | 7.06 | -3.90 | -8.35 | -16.70 | -2.13 | -6.14 | -4.79 | -2.40 | -8.49 | -9.10 |
| | Median | -1.15 | -8.46 | -7.73 | -24.27 | -12.16 | -9.75 | -4.47 | -7.28 | -10.94 | -4.56 | -6.00 | 7.04 | -1.91 | -8.25 | -13.04 | -2.87 | 1.96 | -4.79 | -3.84 | -6.47 | -2.03 |
| Number of firms | | 7 | 10 | 11 | 14 | 16 | 20 | 26 | 31 | 38 | 42 | 40 | 45 | 41 | 39 | 37 | 33 | 28 | 24 | 23 | 21 | 15 |
| Div. payers | | 2 | 5 | 6 | 9 | 10 | 10 | 17 | 21 | 32 | 34 | 35 | 38 | 33 | 32 | 29 | 25 | 21 | 22 | 18 | 17 | 11 |
| Div. non-payers | | 5 | 5 | 5 | 5 | 6 | 10 | 9 | 10 | 6 | 8 | 5 | 7 | 8 | 7 | 8 | 8 | 7 | 2 | 5 | 4 | 4 |

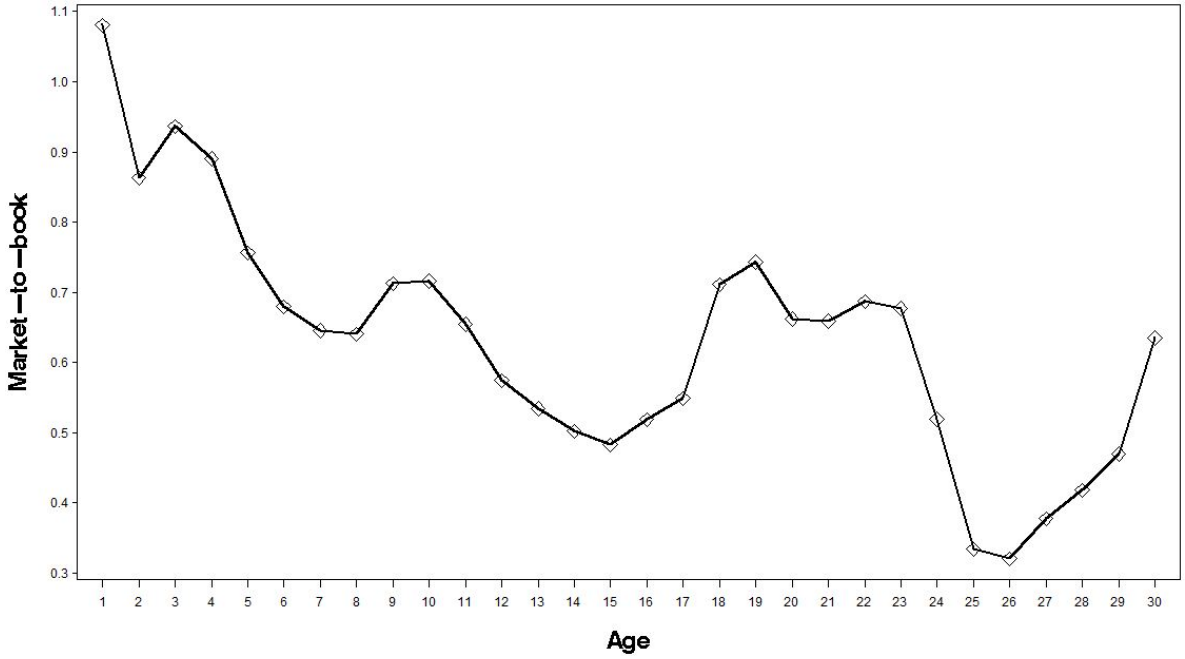
*Panel E. Unexpected accruals (%) as defined in Pourciau (1993)*

| | | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All firms | Mean | -5.90 | 6.41 | 1.16 | -3.77 | 2.03 | -3.34 | 0.22 | 1.37 | -0.53 | -3.76 | 1.96 | 5.95 | -5.91 | 1.26 | -0.48 | 3.35 | -2.17 | -2.78 | 2.83 | -5.42 | 6.87 |
| | Median | -9.71 | 5.53 | 1.43 | 1.35 | -1.20 | 0.17 | 2.42 | 1.41 | -0.49 | -0.44 | -0.82 | 2.16 | -1.33 | -0.86 | 1.60 | 0.57 | -0.32 | -0.94 | -1.15 | 0.08 | 2.42 |
| Div. payers | Mean | -10.54 | 8.03 | -0.14 | -1.26 | 3.92 | -8.91 | 3.87 | 5.42 | -0.22 | -5.28 | 2.64 | 5.39 | -5.66 | 1.76 | 0.80 | 0.71 | -0.05 | -2.09 | 5.18 | -5.15 | 9.59 |
| | Median | -10.54 | 8.11 | 1.43 | 1.35 | -0.36 | -8.14 | 3.41 | 2.33 | -0.26 | -1.16 | -0.67 | 1.80 | 0.03 | -0.53 | 1.60 | -0.24 | -0.66 | 0.00 | -0.58 | 0.48 | 2.42 |
| Div. non-payers | Mean | -4.97 | 5.19 | 2.78 | -8.16 | -0.49 | 0.36 | -5.51 | -4.94 | -1.97 | 1.94 | -2.81 | 9.39 | -6.97 | -0.87 | -4.93 | 11.58 | -8.52 | -10.07 | -5.65 | -6.58 | -0.60 |
| | Median | -8.87 | -2.33 | 0.35 | -2.57 | -1.66 | 0.30 | -1.20 | 1.33 | -0.72 | 1.17 | -3.75 | 5.72 | -4.52 | -2.10 | 1.82 | 3.65 | 3.69 | -10.07 | -7.00 | -2.03 | 1.03 |
| Number of firms | | 6 | 7 | 9 | 11 | 14 | 15 | 18 | 23 | 28 | 38 | 40 | 43 | 41 | 37 | 36 | 33 | 28 | 23 | 23 | 21 | 15 |
| Div. payers | | 1 | 3 | 5 | 7 | 8 | 6 | 11 | 14 | 23 | 30 | 35 | 37 | 33 | 30 | 28 | 25 | 21 | 21 | 18 | 17 | 11 |
| Div. non-payers | | 5 | 4 | 4 | 4 | 6 | 9 | 7 | 9 | 5 | 8 | 5 | 6 | 8 | 7 | 8 | 8 | 7 | 2 | 5 | 4 | 4 |

**Fig.1 Firm value and age**

These graphs plot median values of the market-to-book ratio (MB) for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011.

*Panel A. For all firms*




*Panel B. For dividend payers and non-payers*

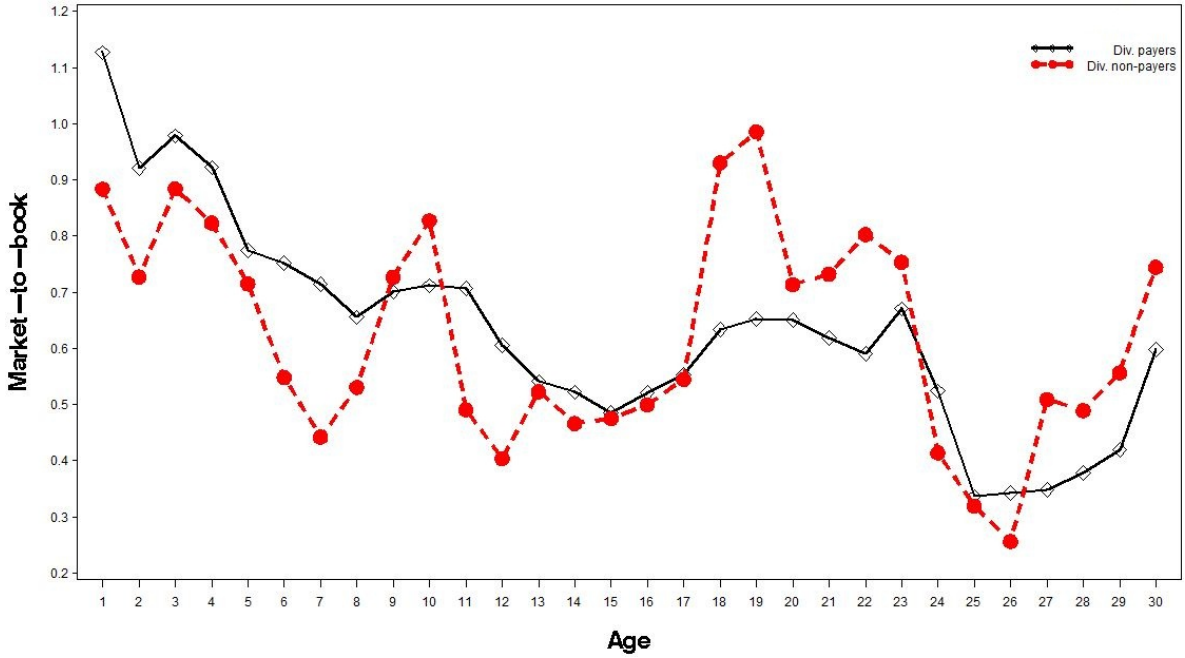
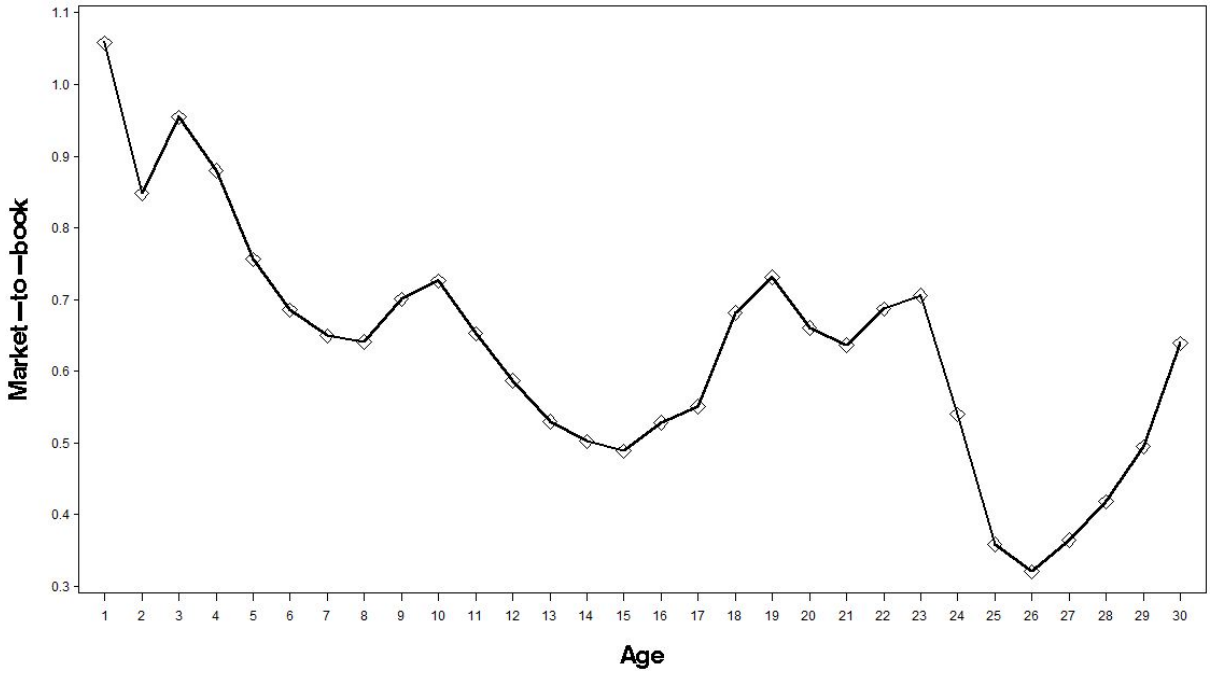


**Fig. 2 Firm value and age for active firms**

These graphs plot median values of the market-to-book ratio (MB) for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011. Unlike Fig. 5, we only examine firms that are active as of the end of 2011. The sample consists of 7,358 firm-year observations (735 firms).

*Panel A. All active firms as of the end of 2011*




*Panel B. Dividend payers vs. non-payers among firms active as of the end of 2011*

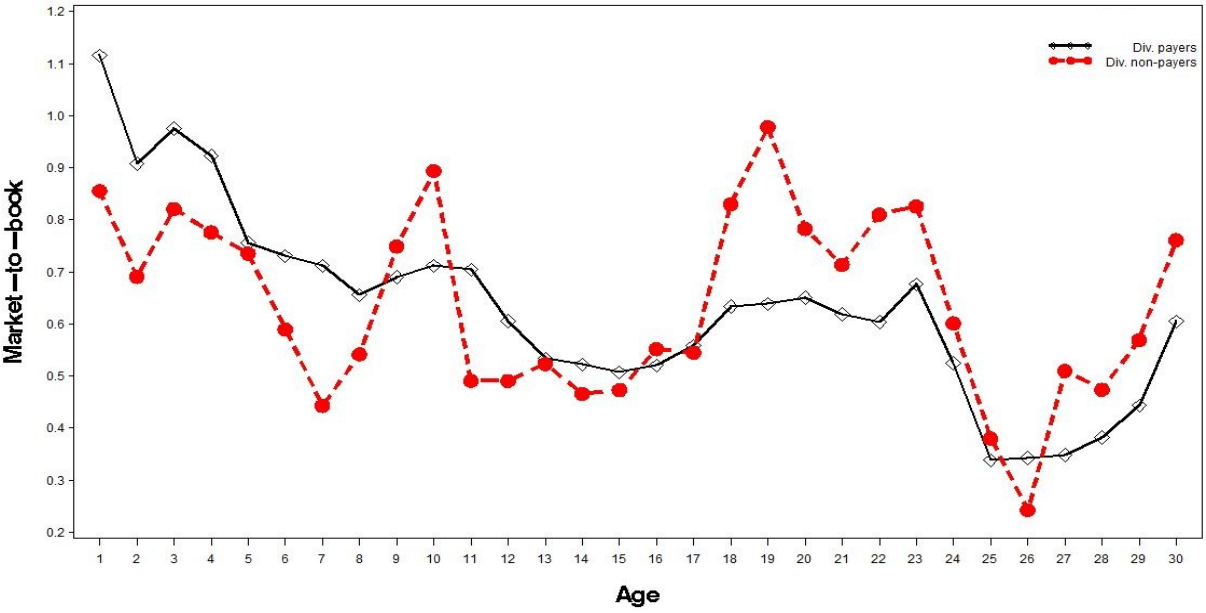
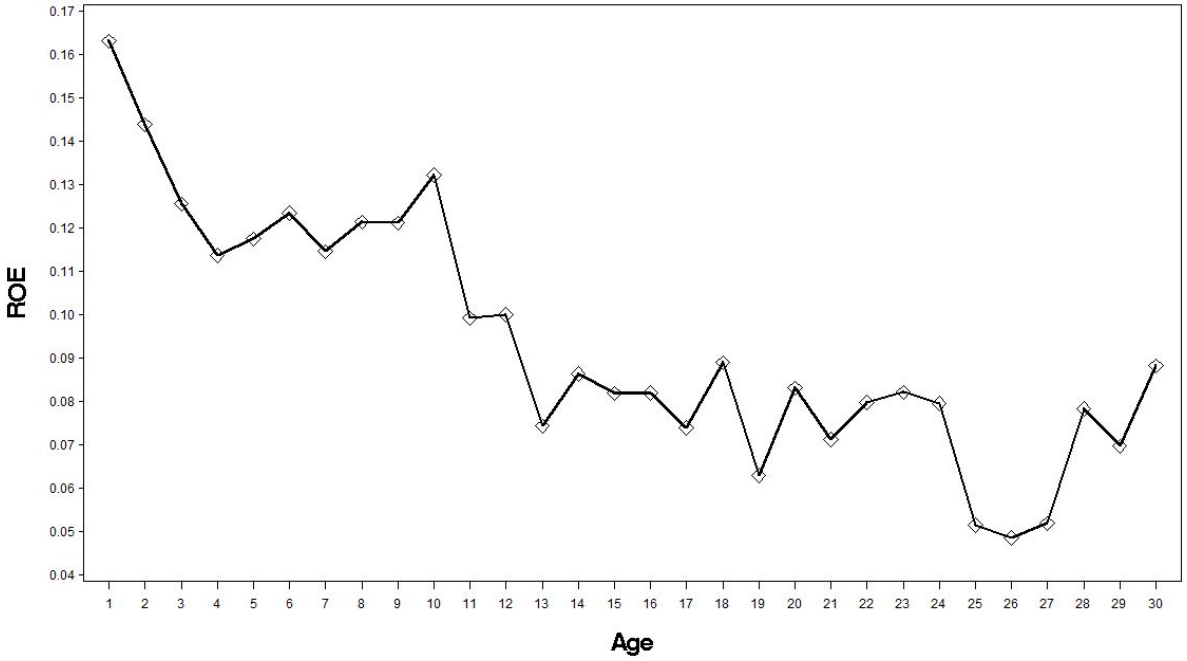


**Fig. 3 ROE and age**

These graphs plot median values of profitability (ROE) for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011.

*Panel A. For all firms*




*Panel B. For dividend payers and non-payers*

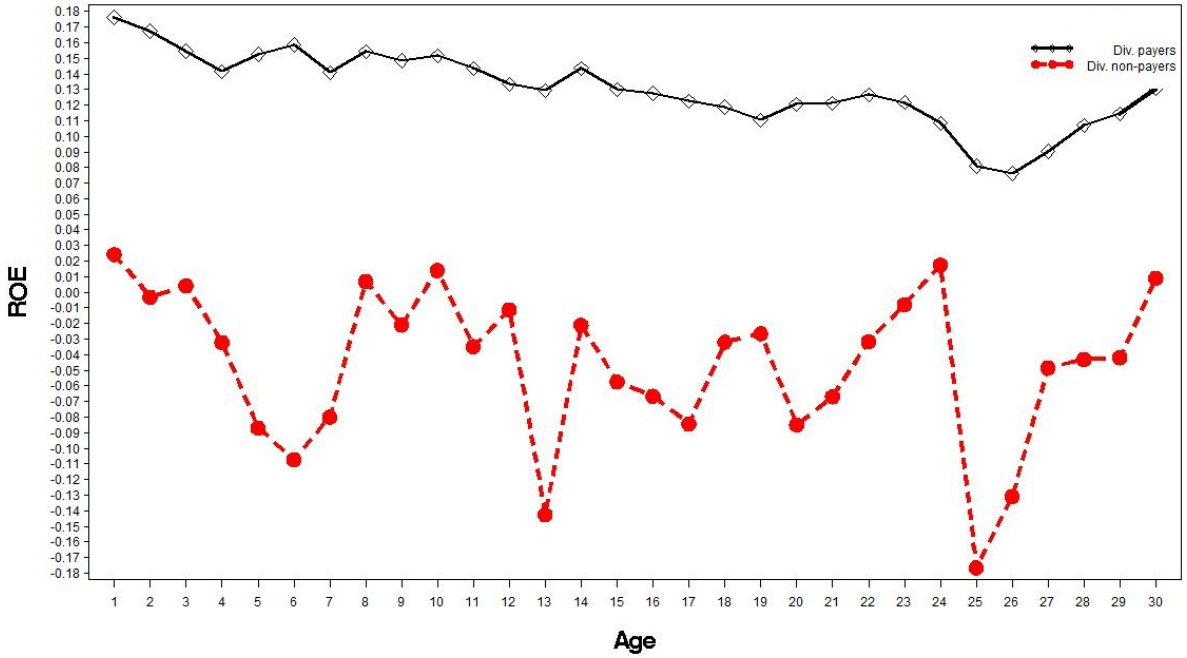
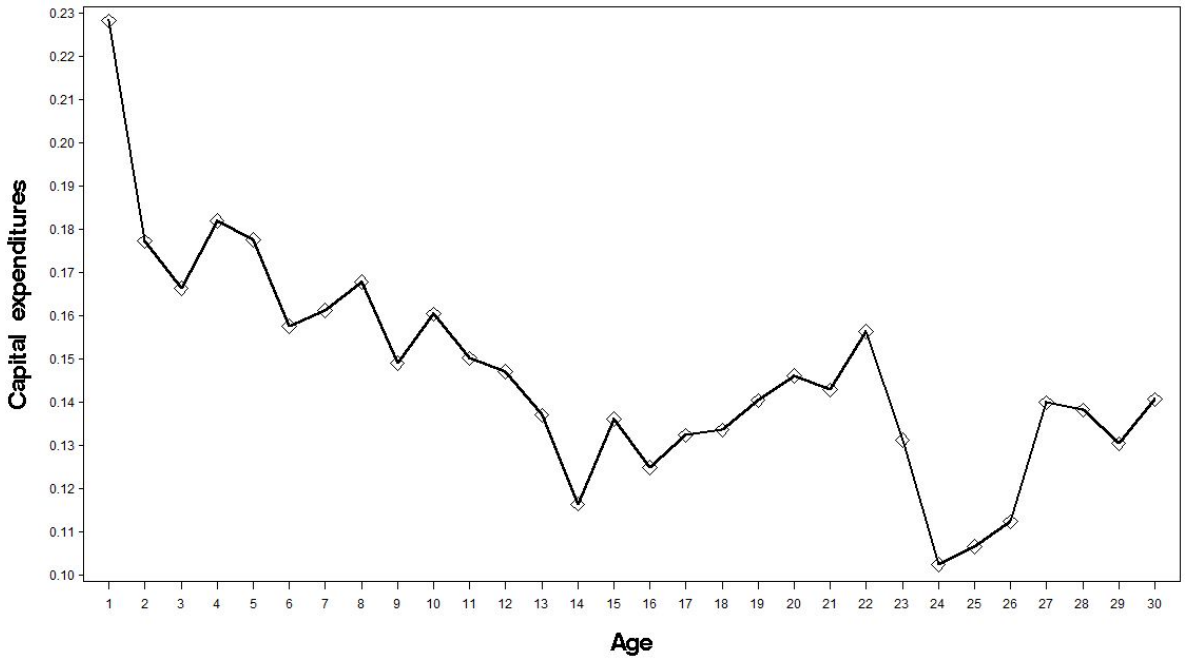


**Fig. 4 Capital expenditures and age**

These graphs plot median values of capital expenditures (scaled by the beginning-of-the year book assets) for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011.

*Panel A. For all firms*




*Panel B. For dividend payers and non-payers*

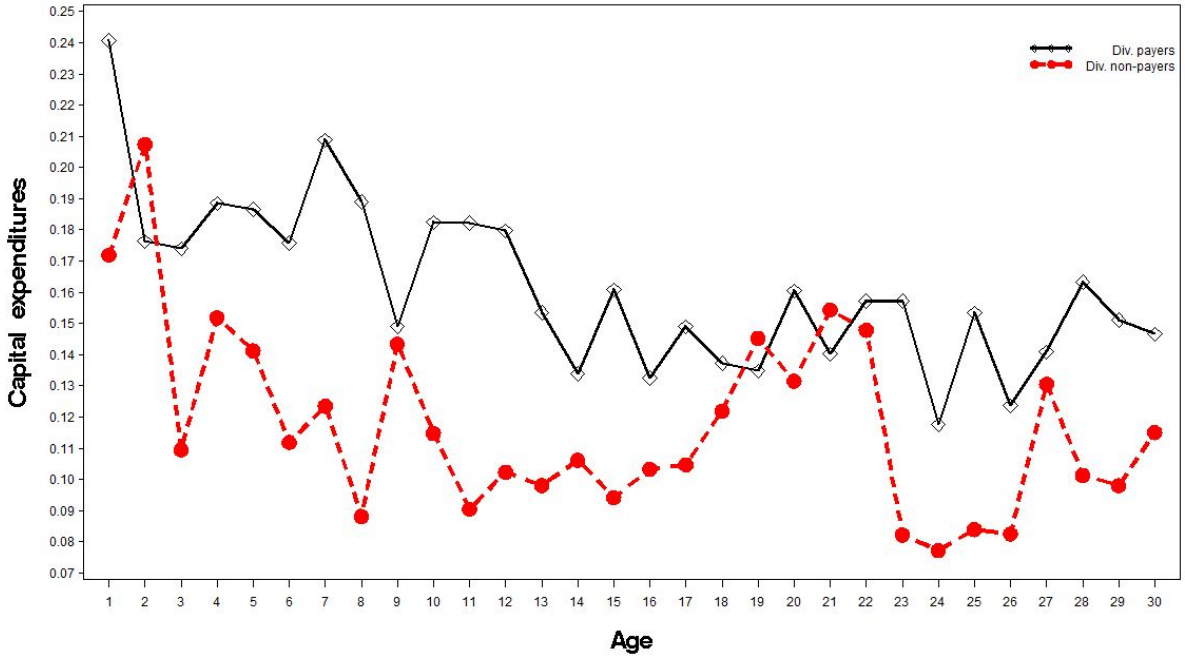
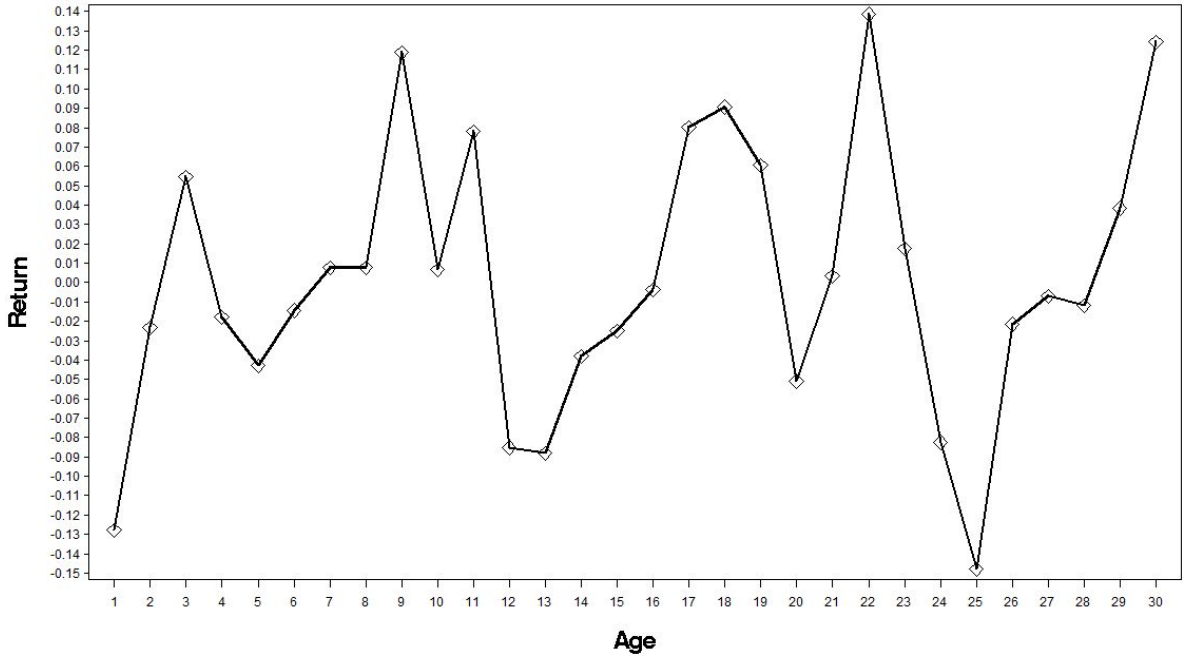


**Fig. 5 Stock return and age**

These graphs plot median values of annual stock return for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011.

*Panel A. For all firms*




*Panel B. For dividend payers and non-payers*

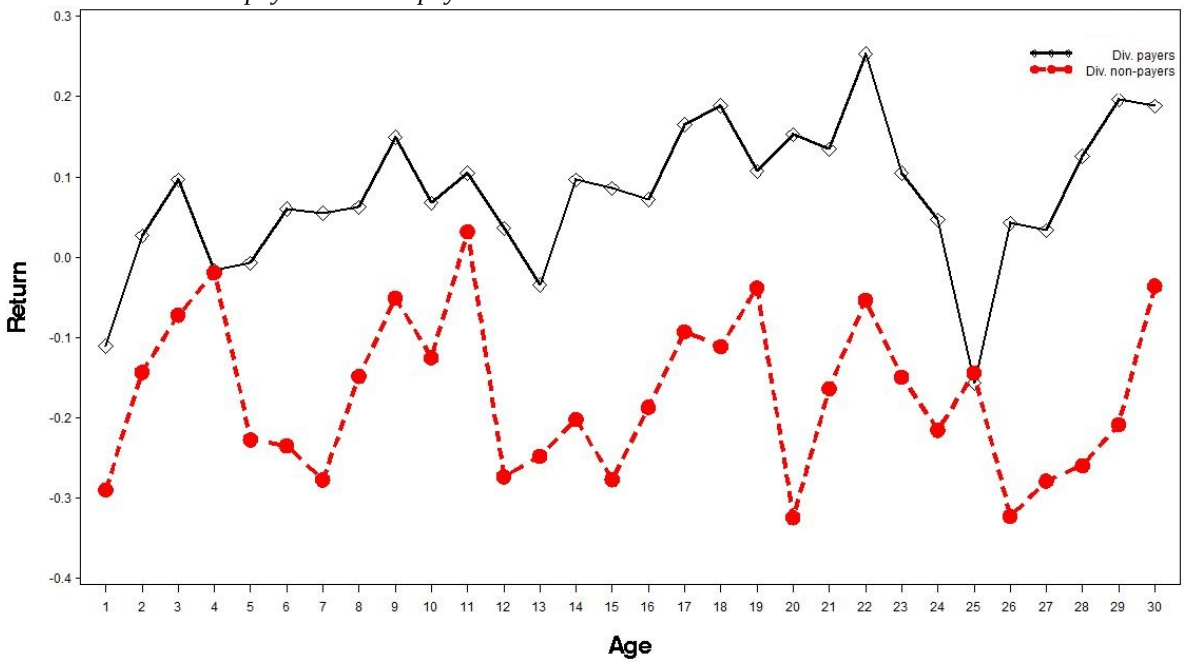
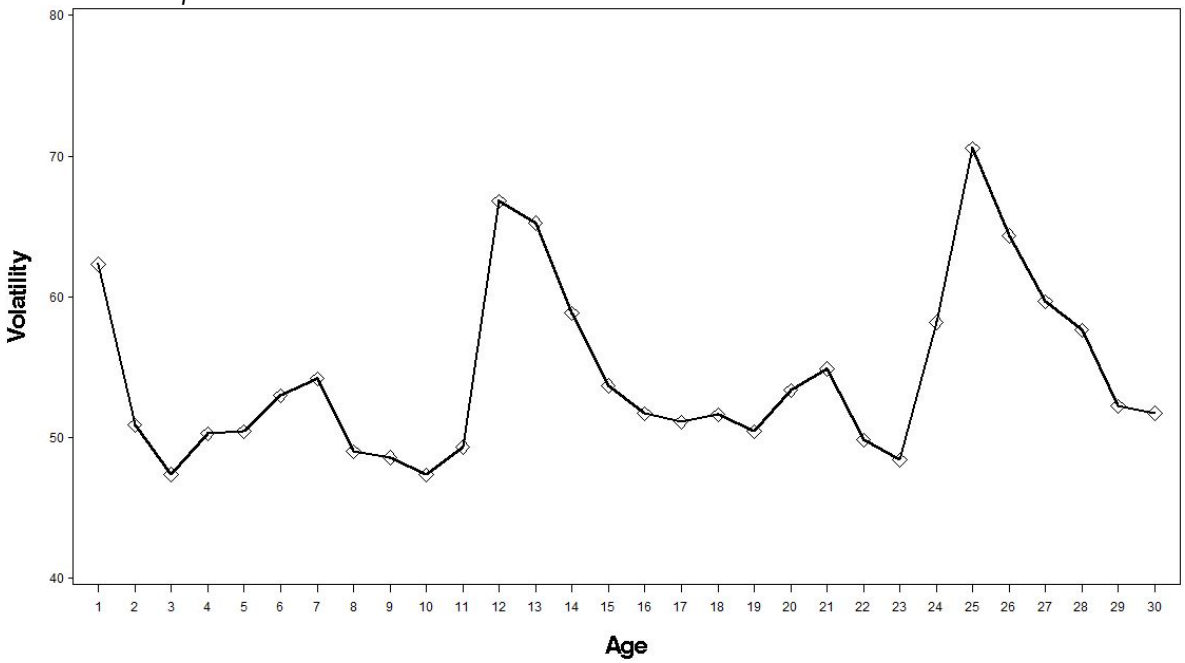


**Fig. 6 Return volatility and age**

These graphs plot median values of return volatility (Volatility) for groups of firms of the same age, where age is measured by the number of years since the firm's listing (i.e., AGE_IPO). The sample consists of firms listed on the KOSPI market of the Korea Exchange (KRX) over the period 2000-2011.

*Panel A. For all firms*




*Panel B. For dividend payers and non-payers*