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Board Diversity, IPO Underpricing, and Firm Value: Evidence from Korea

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ABSTRACT

Purpose: We investigate the impact of board diversity on initial public offering underpricing and firm value. **Design/methodology/approach:** We examine the relationship between board diversity and IPO underpricing by collecting data on the board size and composition of 470 IPOs listed on the Korea Exchange (KRX) for the period 1999-2018.

Findings: We find a significant average first-day return (35.24%), similar to the results of previous studies on IPO underpricing, but the underpricing decreases with an increase in board diversity. Using first-day returns and Tobin's Q as measures of underpricing and firm value, respectively, we find that a larger and more diverse board of directors maximizes shareholder wealth. Specifically, when measured by Tobin's Q, firm value is positively related to the percentage of outside directors and board size. Gender diversity on the board, growth opportunities, and profitability positively influence firm value. Employing a dummy variable for female members to measure the presence of female directors on a board, we find that the presence of female directors significantly enhances firm value. Research limitations/implications: This study has implications for theories of corporate governance in the body of literature on financial decision-making. It analyzes how diversity in boards of directors plays a critical role in determining IPO prices, together with how diversity affects the future value of firms. However, this study still has some limitations in that the effects of IPO underpricing and corporate governance have not been completely analyzed. Therefore, we expect that further studies on additional variables will be conducted to provide meaningful implications. Originality/value: This study bridges the gap between corporate governance and IPO underpricing literature. While many theories on IPO underpricing have been rigorously examined, few have investigated the effects of the board of directors. We analyze how diversity in boards of directors plays a critical role in determining IPO prices, together with how diversity affects the value of firms.

Keywords: Board of directors, Board diversity, Corporate governance, Initial public offering, Underpricing

I. Introduction

One of the most interesting puzzles in corporate finance is the underpricing of initial public offerings

(IPOs), commonly defined as a high first-day closing price for the IPO relative to its offering price (Ljungqvist 2007). The underpricing of IPOs has been the subject of extensive theoretical and empirical research. However, despite decades of research, there remains considerable disagreement on the reasons of IPO underpricing. Explanations for IPO underpricing range from information friction, agency problems, and litigation to cognitive and behavioral causes. While most of these theories

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on IPO underpricing have been rigorously examined and many have received empirical support, few have investigated the effects of the board of directors.

The board of directors is a key decision-making body in a corporation. These boards are responsible for approving major financial decisions, such as changes in the capital structure, capital budgeting, dividend payouts, and the issuance of financial securities (including IPO decisions). However, in relation to its crucial role in a corporation, this body has received less attention in corporate finance research. In today's literature, it is becoming important to focus on this key body, given that boards of directors have evolved from small and homogeneous to large and diverse entities. This diversity influences firm performance. According to studies, board diversity positively impacts profitability and firm performance (Campbell and Ferreira 2009; Campbell and Minguez-Vera, 2008). Board diversity is measured by tenure, age, race, gender, and members' experience (Adams and Ferreira 2009; Morrison, 1992). For example, the enhanced strategic capabilities of women (Adams and Ferreira, 2009) increase a firm's operational performance (Johnson, Daily, and Ellstrand, 1996) and economic gains, and hence more eligible women should be appointed to the boards of firms. According to Hambrick and Mason (1984), because a diverse board is less susceptible to groupthink or herding behavior, it can more effectively monitor any possible emergence of the agency problem with the management team. Diversity can also facilitate effective signaling, which reduces information asymmetry between firms and investors and, in turn, enables the former to reduce underpricing and increase capital gains. Carter, Simkins, and Simpson (2003) suggested that a more diverse board is associated with incremental value. Conversely, Yermack (1996) showed that a larger board negatively impacts value, mostly because of the costs involved in coordinating decision-making processes.

This study contributes to the existing business literature as follows. First, it provides an important test case of the effects of board diversity on firm value. In the findings of previous studies, board diversity typically increases firm value. Going public is one of the most important stages in the lifecycle of firms. Thus, by determining an offering price to run newly listed firms after IPOs, boards of directors must decide absolutely critical decisions as a group. In addition, because the IPO sample herein is mainly composed of relatively similar firms with high growth opportunities in uncertain circumstances, controlling other components might be a minor issue in testing our hypothesis. In addition, it is critical to test how diversity in board members can increase firm value. In Korea, race, language, or education levels are not important factors in board diversity because most of the Korean population is homogeneous. As a proxy for board diversity, we assess board size, the ratio of outside directors, and the presence of female directors. Thus, this study contributes to the existing literature by providing alternative testing variables for board diversity in Korea.

Within this context, this study focuses on the relationship between board diversity and IPO underpricing. We also analyze whether board diversity has a negative relationship with the underpricing of IPOs. The relationship is examined using data collected from 470 listed firms on the Korea Exchange (KRX) for the period 1999-2018. We find that larger boards contribute to a decline in underpricing. The results also show a negative relationship between the ratio of outside directors and first-day returns, an association that implies less underpricing. In ascertaining whether firm value is influenced by board diversity, which is measured by the number of outside and female directors, we find a positive relationship between board diversity and long-term firm value. Specifically, when measured by Tobin's O, firm value is positively related to the percentage of outside directors and board size. Our results support previous empirical evidence that more diverse boards enhance firm value, and hence firms can use board diversity as a strategy to enhance value.

We also find that a board with female members can play a more effective role in promoting firm value. Employing a dummy variable for female members to measure the presence of female directors on a board, we find that the presence of female directors significantly enhances firm value. Our findings support the view that board diversity should be promoted as a common corporate governance practice.

II. Literature Review

One puzzling aspect of IPOs is that securities may be underpriced when they are issued to the public for the first time. Empirical findings related to IPO underpricing are consistent across studies in finance literature—and underpricing has been the subject of extensive research (Ritter and Welch, 2002; Ljungqvist, 2007; Lowry, Michaely, and Volkova, 2017).

IPO underpricing is a phenomenon in which the first-day returns of an IPO are higher than the IPO offering price. The one-day average return for IPOs has been historically high around the world. In the U.S. 1960-2003, on an average, the price at the end of the first day of trading was 18.3% higher than that of the IPO offering price. This underpricing phenomenon exists in every country with a stock market. The work of Ritter (1991), however, finds that newly listed firms exhibit poor long-term performance after their IPOs. In short, IPO firms tend to show positive first-day returns that hurt firm value in the long-term.

IPOs in the Korean market also show strong positive first-day returns. The degree of IPO underpricing in Korea is larger than that in other developed countries, and this phenomenon has led to the long-term underperformance of Korean IPOs. Several studies have presented evidence of this underperformance, with some research providing a behavioral explanation for this IPO puzzle. Behavioral theories assume that favorable market conditions, prevailing at the time of an IPO, generate over-optimism among some investors, who in turn bid up the offer price beyond the intrinsic value. This eventually leads to a decline in the aftermarket share price in subsequent months. The work of Kim and Jung (2010) explores the higher initial returns and the poorer long-run performance in Korean IPO markets in the context of market conditions. That research finds that initial returns and the long-term underperformance of IPOs in a hot market are significantly higher than those in a cold market. The research provides evidence that optimistic investors' sentiments have a positive effect on initial returns and a negative effect on long-term performance.

Although studies have provided several explanations for IPO underpricing, few have investigated this puzzle in relation to the corporate governance theory. Specifically, few studies have discussed IPO underpricing in relation to the influence of board diversity on underpricing and the long-term value of IPO firms. According to Cox and Blake (1991), Robinson and Dechant (1997), and Carter, Simkins, and Simpson (2003), board diversity exerts multifarious benefits on corporations. Diversity increases an understanding of the marketplace, facilitates creativity and innovation, increases the efficacy of problem solving and corporate leadership, and promotes effective global relationships.

Empirical evidence from US-based studies suggests that board characteristics have an impact on firm performance. Research by Baysinger and Butler (1985) shows that a higher number of outside directors enhances firm performance and that investors view the appointment of an outsider to the board as good news (Rosenstein and Wyatt, 1990). Gender composition is also expected to have a positive impact on firm performance. Better board gender diversity can enhance decision-making when assessing a wider variety of perspectives and issues and a broader range of outcomes (Daily and Dalton, 2003). The presence of more female directors may stimulate participative communication among board members. If female directors are more participative (Eagly and Carli, 2003), democratic (Eagly and Johnson, 1990), and communicative than men (Rudman and Glick, 2001), as the research suggests, then increasing the proportion of women on boards could encourage more open conversations among the members of boards. Based on an examination of the Hong Kong market, McGuinness (2018) found a correlation between the presence of women on the board and long-term performance, although there was little evidence of the relationship of board gender diversity to IPO underpricing.

Some studies in corporate governance focus on the structure of the board of directors in emerging Asian markets. The work of Huang and Chan (2018) examines firms' operating performance following the initial resignation of independent directors in Taiwan. Findings therein show that firm performance not only deteriorates, but also tends to be significantly below the industry average following the initial resignation of independent directors. Thus, in Taiwan, independent directors mitigate the agency problem in firms that have lower insider or institutional shareholdings. The work of Lizares (2020) investigates board structurefirm performance relationships in Philippine conglomerates. The research finds a negative association between a higher proportion of outside independent directors and firm performance. This result-that independent directors within Philippine conglomerates negatively affect firm performance-is probably due to the unique characteristics of the research sample. Conglomerate companies without outside directors may demonstrate positive performance insofar as their decision-making behaviors are likely to reflect a long-term perspective because ownership and management are both within the family category (Berrone, Cruz, and Gomez-Mejia, 2012). Research by Shan and Mclver (2011) provides empirical evidence on the influence of corporate governance characteristics and corporate ownership concentrations on the financial performance of Chinese companies. The results show that the degree of board independence is significant, but it appears to have a positive impact on performance only in larger companies. If small firms are less affected by independent directors, then this study on IPOs will be a good test case because we include sample firms, which are relatively young and small, but growing. As a robustness check, we run the same empirical tests on small-sized firms as a subsample following our tests with the whole sample.

III. Theory

A. Theories related to IPO underpricing

Ritter and Welch (2002) review possible explanations for IPO underpricing. They classify underpricing theories based on whether asymmetric information or symmetric information is assumed.

First, if an issuer is more informed than investors, then rational investors fear the lemon problem described in the seminal research by Akerlof (1970). In this signaling model, better quality issuers deliberately sell their shares at a lower price than the market indicates. The evidence in favor of this signaling theory has been mixed. Jegadeesh, Weinstein, and Welch (1993) find that returns after the first day are just as effective in inducing future issuing activity as first-day returns are. However, Michaely and Shaw (1994) rejected signaling outright in simultaneous equation model.

A more realistic assumption is that investors are informed differently. Rock (1986) proposes a model in which extremely high pricing might induce the dear of winner's curse in investors and issuers. In a winner's curse, investors fear that they will only receive full allocations if they happen to be among the most optimistic investors. An investor stands to receive a full allocation of overpriced IPOs, but only a partial allocation of underpriced IPOs. Therefore, investors need underpriced shares.

Baron (1982) offers an agency-based explanation of underpricing. The theory assumes the issuer to be less informed, relative not to investors but to its underwriter. To induce the underwriter to put in the requisite effort to market shares, it is optimal for the issuer to permit some underpricing because the issuer cannot monitor the underwriter without cost. Habib and Ljungqvist (2001) argue that underpricing is a substitute for costly marketing expenditures. All theories of underpricing based on asymmetric information share the prediction that underpricing is related to the degree of asymmetric information.

Other existing theories of underpricing do not rely on asymmetric information. Tinic (1988) and Hughes and Thakor (1992) argue that issuers underpriced to reduce their legal liability. Drake and Vetsuypens (1993) find that IPOs that had been sued had higher underpricing. This means that underpricing does not protect issuers from being sued. However, Lowry and Shu (2002) point out that this may be because the IPOs that are more likely to be sued at a later point in time also tend to be more underpriced. Ritter and Welch (2002) argue that underpricing appears to be a cost-effective way to avoid subsequent lawsuits.

Boehmer, Boehmer, and Fishe (2006) note that the

higher the trading volume in the aftermarket, the greater the underpricing. Thus, any underwriter that makes a market stands to gain additional trading volume. Unlike the lawsuit avoidance explanation of underpricing, this explanation does not clarify how the issuing firm benefits from the underpricing.

Loughran and Ritter (2002) explore the conflict of interest between underwriters and issuers. If underwriters are given discretion in share allocations, then the discretion will not be used in the best interests of the issuing firm. Underwriters might intentionally underprice (i.e., leave more money on the table), subsequently allocating these shares to favored buyside clients. The mystery is why issuing firms generally appear to be underpriced. Loughran and Ritter use prospect theory to argue that managers are more tolerant of excessive underpricing if they learn that the post-market valuation is higher than expected.

IPO underpricing can be understood as the cost to existing shareholders of issuing firms. The managers' role is to maximize shareholder wealth to ensure that the offering price is set appropriately; nevertheless, they tolerate underpricing. Therefore, managers seem to be more interested in the event of a firm going public itself rather than shareholder interests.

B. Agency problem: managerial overinvestment

The relationship between shareholders and management is called an agency relationship. In such a relationship, there is a possibility of a conflict of interest between the principal and the agent. According to Jensen and Meckling (1976), this type of conflict describes the agency problem. Problems in overinvestment have to do with the possibility that managers can abuse their decision-making power by adopting unprofitable or overly risky projects with the potential to damage the interests of the shareholders.

The problem of managerial overinvestment is based on the hypothesis that managers emphasize the importance of their role differently from that of the shareholders. Jensen (1986) connects overinvestment to the ways in which managers use the financial resources produced by firms. Managers prefer to use the free cash flow for opportunistic purposes, when profitable investment projects and growth opportunities are lacking. As Jensen (1986) and Stulz (1990) point out, firm expansion beyond what may be considered an optimal level and the increase of resources directly under managerial control potentially offer greater power and prestige (i.e., *empire building*).

Managerial overinvestment may also take another form (*entrenchment purpose*) such as a self-defense mechanism. Shleifer and Vishny (1989) assert that managers prefer investing in projects that have a negative net present value (NPV) but ones that increase their own human capital, thus making firm activity inseparable from the personal skills of talented employees.

Another source of overinvestment is generated by managerial overconfidence. While acting in good faith, and with the goal of maximizing value for shareholders, managers may at times overestimate their abilities or be overly optimistic (Stein, 2001). By placing too much confidence in their own abilities, managers can end up perceiving less risk than there actually is in various situations. Thus, all the uncertainties must be carefully evaluated (Malmendier and Tate, 2005).

IV. Hypotheses

Based on the existing literature and the theories above, we propose the following two hypotheses regarding IPO underpricing: long-term firm value and board diversity. First, this study examines the relationship between board diversity and IPO underpricing. With an IPO, firms face a potential cost if the offering price is set very low. If the offering price is below the true market price, then the existing shareholders will experience an opportunity loss.

Therefore, firms with diverse boards should have less underpricing. We assume that firms with diverse boards determine an offering price close to the true market value in order to maximize the existing shareholders' wealth.

IPO underpricing is unbeneficial to existing shareholders to such an extent that the phenomenon is referred to as "money left on the table" (defined as the difference between the closing price on the first day of trading and the offer price, multiplied by the number of shares sold). Underpricing is a cost to firms because the stock is sold for less than its true value. In cases of underpricing, because the offering price is established at a very low level, the roles of the managers and the controlling boards of directors can be said not to have functioned sufficiently. In fact, boards of directors are more important because managers have an overinvestment incentive to increase firm size and to gain a reputation for being the manager of a listed company. If the structure of the board of directors is homogeneous, then there is a higher possibility that managerial behavior may be difficult to control due to challenges in the progressive discourse among board members. Previous studies show that the higher the proportion of outside directors on a board, the greater the regard investors tend to have for the board and the firm (Rosenstein and Wyatt, 1990). In addition, the more diverse a board is, the better the firm's performance. Therefore, in this study, hypothesis 1 incorporates how a diverse board of directors will appropriately control the behavior of managers and contribute to establishing the appropriate level for an IPO offering price.

Hypothesis H1. Increased board diversity leads to a decrease in IPO underpricing (lower first-day returns).

Although IPO firms generally perform well immediately following the IPO, newly listed firms subsequently appear to perform relatively poorly over the following three years after IPOs. Therefore, we focus on IPO firms' value after the IPOs. Subsequent underperformance of IPO firms is related to underpricing. We assume that firms with less diverse boards are poorly managed. Accordingly, the following hypothesis empirically examines whether board diversity enhances firm value after an IPO.

Hypothesis H2. Increased board diversity enhances a firm's market value after an IPO.

In short, we examine the influence of board diversity on the determination of the offer price and its ensuing influence on the long-term value of a firm. As a proxy for board diversity, we focus on the number of outside directors, board size, and gender composition. An increase in the number of outside directors on a board, the presence of female directors, and the board size diversify the board. In turn, board diversity drives firms to maximize capital gains, and thereby lowering underpricing and increasing long-term firm value following IPOs.

V. Methodology

The financial documents (including the prospectus) of newly listed firms on the Korean stock market (the Korea Composite Stock Price Index (KOSPI) and the Korean Securities Dealers Automated Quotations (KOSDAQ)) are registered with the Financial Supervisory Service (a financial authority) in Korea. For the period 1999-2018, we analyze the financial reports of these firms submitted for the data analysis, retrieval, and transfer system (DART) in order to obtain data on the board of directors.1) It must be noted that a board monitors executive officers, which is a critical mechanism for publicly traded firms. Specifically, we manually collect the data on the total number of directors, the gender composition of the board, and the number of inside (or outside) directors. We also computed the age variations of the directors. Data on financial statements and stock returns are obtained from the FnGuide database, a Korean company that offers financial market data and solutions for users. Firms in the financial and utilities industries were excluded from our analysis. Following this data-collection procedure, a sample of 470 observations was obtained. Female directors accounted for 10% of the total number of the sampled directors.

The year 1999 was used as the starting point of the data, as it was when the financial crisis of 1997 was overcome and the IT venture boom started in the Kosdaq market.

To examine the potential relationship between IPO underpricing and board diversity, we run the following regression:

$$Underpricing_{i} = \alpha_{0} + \beta_{1}Board \ Diversity_{i} + \sum_{j=1}^{n} \alpha_{j}X_{i} + \epsilon$$
(1)

where the underpricing (*Und_PRC*) is measured as the first-day return, which is the closing price minus the offer price over the offer price on the listing date. Board diversity is mainly measured by either the size of the board or the number of outside directors. *Bsize* is the number of directors on the board of directors on the reporting date, and *Outside* captures the proportion of outside directors on the board. The term X is a vector of control variables. In some cases, we also use *WOMAN* (a dummy variable equal to unity if a company has a female director) and *AGE_SD* (the variability in directors' ages) as supplemental measures of board diversity. The control variables are capital expenditure divided by the total revenue (CAPEX) (Yermack, 1996; Smith and Watts, 1992), *YEAR* (the natural log of firm

Table 1. Deminition of variables	Table	1.	Definition	of	variables
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age at IPO), *LEV* (the leverage ratio), and *ROA* (return on assets) (Carter, Simkins, and Simpson, 2003). The error term is expressed as ϵ . In conducting the regression model above, it is important to avoid multicollinearity. Thus, we do not include a variable for firm size (the log of total assets), which is strongly correlated with *Bsize* and *Outside* variables. Next, we analyze the relationship between the firm's market value after the IPO and board diversity by running the following regression:

Firm
$$Value_i = \alpha_0 + \beta_1 Board Diversity_i$$

 $+ \sum_{j=1}^{n} \alpha_j X_i + \epsilon$ (2)

We use Tobin's Q ratio as a measure of a firm's market value (*Value*). In the spirit of Lemmon and Lins (2003), we calculate Tobin's Q ratio as the ratio of the total market value divided by the book value one year after the IPO. We employ the control variables to account for firm variations not explained by our two main explanatory variables: board size and outside directors. Table 1 presents the variables in detail.

Variables	Measurement
Dependent Variable	es
Und_PRC	Underpricing; (first-day price - offering price) / offering price
Value	Firm value; Tobin's Q (Lemmon and Lin, 2003); the ratio of total liabilities plus the market value of equity divided by the book value of total assets
Independent Variat	oles
Bsize	Board size; total number of directors
Outside	Proportion of outside directors
WOMAN	1 if female directors present, 0 otherwise
AGE_SD	Variability in directors' ages; standard deviation of ages
Control Variables	
CEO_A	Age of CEO
MGR_A	Average ages of managers
CAPEX	Capital expenditure divided by total revenue
YEAR	Natural logarithm of firm age at IPO
LEV	Leverage ratio; total liabilities to total assets
ROA	Return on assets; net income divided by total assets
SIZE	Natural logarithm of total assets
NSHR	Proportion of new shares issued; IPO shares divided by existing shares

VI. Data Analysis

A. Summary statistics and correlation analysis

Table 2 Panel A presents descriptive statistics of the variables used in our analysis. On average, our corporation sample has a board of directors with 4.82 directors, of which 1.40 are outside directors (29.05% of all the boards). The median board size is 6 members, which suggests a fairly normal distribution. The largest board has 12 directors and the smallest one has 3 members. Our descriptive statistics show institutional differences between the US and Korean corporations. The mean board size of the Forbes Magazine sample in the work of Yermack (1996) is 12.25, while the work of Carter, Simkins, and Simpson (2003) reports a mean board size of 10.98 based on a sample of Fortune 1000 firms. We also find variation in the board compositions of the US and Korean firms. While the proportion of inside directors accounts for 70.95% of our Korean sample, they have been shown to account for 36% and 2.62% of the samples in studies by Yermack (1996) and by Carter, Simkins, and Simpson (2003), respectively. In comparison to large US corporations, the IPO firms comprising our sample have both smaller board sizes and fewer outside directors. Most of the sample firms have boards that are composed entirely of men. Our Korean sample is characterized by a low proportion of women directors. In terms of age, on an average, the sampled directors are approximately 51 years old, while CEOs are older (53.17 years on average) than directors.

Panel B shows the sample distribution by industry and market. The majority of the samples (78.09%) were IPOs in the Kosdaq market. In particular, all ITrelated firms (IT hardware of 21.91% and IT software & service of 9.15%) are listed on the Kosdaq. In addition, about half (48.50%) of the Kosdaq firms are in other manufacturing industries that are not clearly identified. All entertainment & culture and telecom broadcasting service firms are on the Kosdaq. On the other hand, companies belonging to capital-intensive industries (transport equipment, chemical, machinery, pharmaceuticals, steel & metals, non-metallic minerals, and electric & electronics) are listed on the Kospi market. Table 3 presents the correlation matrix across the variables. The variables pertaining to board diversity (*Bsize, Outside*, and *AGE_SD*), with the exception of *WOMAN*, are negatively related to *Und_PRC*. Thus, board diversity decreases firms' underpricing. In other words, the correlation results show that the more diverse boards are, the higher the offering prices are in firms. We find a positive relationship between firm value (*Value*) and future growth opportunities and profitability, as measured by *CAPEX* and *ROA*, respectively. We failed to find significant correlation coefficients of the relationship between *Value* and board diversity (*Bsize* and *Outside*), despite positive correlations. However, the *WOMAN* variable is positively and significantly correlated with the *Value*.

B. Board diversity-univariate analysis

Table 4 presents the results of the comparison of firm characteristics between the two groups based on the proportion of outside directors. To compare firms' high and low board compositions of outside directors, we divide the sample into two groups: boards that have a majority of outside directors (exceeding 50%) and those with outside directors in the minority (less than 33%). Boards with several outside directors in the middle of the two groups were excluded from the comparison. Boards with a majority of outside directors are larger in SIZE (total assets); unsurprising insofar as a larger board is more likely to have an outside director. Concerning the age of directors, the average age of both directors and CEOs is higher in boards with a majority of outside directors. The age variability in directors is also greater in firms with a higher proportion of outside directors.

We obtain interesting results on firm value (measured Tobin's Q ratio) and future growth opportunities (proxied by capital expenditure). Although statistically insignificant, capital expenditure is higher in firms with a higher proportion of outside directors than in firms with a lower proportion of outside directors. Firm value is higher and statistically significant in firms with a higher proportion of outside directors.

Table 2. Sample description

Variables	Mean	Median	MIN	MAX	S.D.
Bsize (board size)	4.822	4.0	3.0	12.0	1.499
Number of outside directors	1.401	1.0	0.0	6.0	1.144
Outside (%)	26.78	25.00	0.00	80.00	18.47
MGR_A	51.47	51.25	34.75	77.20	5.87
AGE_SD	6.19	5.69	0.00	18.01	3.342
CEO_A	53.17	53.00	32.00	79.00	8.226
Number of female directors	0.100	0.0	0.0	3.0	0.327
Und_PRC (underpricing)	35.24	19.67	-30.00	315	49.13
Value (Tobin's Q)	1.628	1.319	0.454	9.291	1.014
ROA	8.136	6.830	0.022	33.32	6.336
SIZE	11.48	11.24	9.42	16.07	1.146
CAPEX	0.112	0.047	-0.0794	2.568	0.199
YEAR (firm age)	15.429	11.920	0.093	67.293	10.799
NSHR (% new issued)	25.27	23.92	3.95	90.66	12.37
LEV	30.82	27.78	1.94	76.93	17.41

Panel B. Sample distribution by industry and market

Industry	Kospi	Kosdaq	Total	(%)
Other Manufacturing	2	178	180	38.30%
IT Hardware	0	103	103	21.91%
IT Software & Service	0	43	43	9.15%
Other Services	27	16	43	9.15%
Distribution	11	14	25	5.32%
Transport Equipment	11	0	11	2.34%
Chemical	9	0	9	1.91%
Machinery	8	0	8	1.70%
Construction	3	4	7	1.49%
Transport & Warehouse	7	0	7	1.49%
Entertainment & Culture	0	6	6	1.28%
Pharmaceuticals	6	0	6	1.28%
Steel & Metals	5	0	5	1.06%
Electric & Electronics	4	0	4	0.85%
Non-metallic Minerals	3	0	3	0.64%
Foods & Beverage	3	0	3	0.64%
Telecom Broadcasting Service	0	3	3	0.64%
Textile & Apparel	2	0	2	0.43%
Medical Equipment	2	0	2	0.43%
Total	103	367	470	100.00%

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lation
Corre
ble 3.

Table 3. C	orrelation m	atrix											
	Und_PRC	Value	Bsize	Outside	WOMAN	AGE_SD	CEO_A	MGR_A	CAPEX	YEAR	TEV	ROA	SIZE
Value	0.1893**												
Bsize	-0.1450*	0.0518											
Outside	-0.1498*	0.0071	0.3048***										
WOMAN	0.0644	0.2447 * *	-0.0050	-0.0199									
AGE_SD	-0.0354	-0.0472	-0.0719	0.1197	0.0302								
CEO_A	0.0536	-0.0603	0.0681	0.1267	-0.0764	0.1827^{**}							
$MGR_{-}A$	-0.0435	-0.0968	0.1321	0.1906^{**}	-0.2303***	-0.0048	0.6044***						
CAPEX	-0.1043	0.1626^{*}	-0.0779	0.1337	-0.0082	-0.0278	-0.0278	-0.0658					
YEAR	-0.0914	-0.1418*	0.0813	0.0732	0.0410	0.1917**	0.2065**	0.2851***	-0.1641*				
LEV	-0.0645	-0.1356	0.2134**	0.0966	-0.1569*	-0.1318	0.0695	0.2257***	-0.0662	-0.0678			
ROA	-0.0615	0.3386***	-0.1495	-0.1495*	-0.0361	0.0150	-0.1247	-0.1724**	-0.0539	-0.1336	-0.4431***		
SIZE	-0.0602	0.1988^{**}	0.4034^{***}	0.4222***	0.0242	-0.1348	0.1336	0.2619***	0.1402^{*}	0.0626	0.4652***	-0.3193***	
NSHR	-0.0073	-0.1712**	-0.2000**	-0.1328	-0.0372	-0.0221	-0.0126	-0.0729	-0.0900	0.0412	-0.0746	0.0043	-0.2410***
Note: signif	icant at * 10%	level, ** 5%	level, *** 1%	level									

Table 4. Comparison of boards with majority and minority outside directors

Variables	Board with Ma (N =	ajority Outsiders 213)	Board with Min (N =	Board with Minority Outsiders $(N = 258)$	
	Mean	SD	Mean	SD	-
Bsize***	5.55	1.56	4.22	1.14	0.000
Number of outside directors***	2.38	0.88	0.59	0.54	0.000
Outside***	42.84	10.43	13.52	11.99	0.000
MGR_A***	53.23	5.723	50.02	5.598	0.000
AGE_SD***	6.78	3.406	5.72	3.218	0.000
CEO_A***	55.33	8.026	51.38	7.969	0.000
Number of female directors*	0.136	0.357	0.070	0.298	0.016
Und_PRC (%)	31.41	45.28	38.39	51.96	0.940
Value*	1.695	1.048	1.573	0.983	0.096
ROA	8.487	6.126	7.8466	6.501	0.137
SIZE***	11.935	1.258	11.109	0.887	0.000
CAPEX	0.098	0.156	0.124	0.229	0.929
YEAR***	17.685	12.772	13.565	8.425	0.000
NSHR***	27.86	13.66	23.13	10.77	0.000
LEV*	32.11	18.41	29.76	16.51	0.075

*, **, *** are significant at 1%, 5%, 10%, respectively.

These results are consistent with the consensus of the literature, which suggests that boards with a higher proportion of outside directors tend to be more effective in controlling the agency problems in CEOs. In terms of financial characteristics, firms with a majority of outside directors have a statistically lower ROA ratio, which suggests that profitable firms are more likely to appoint an inside directors. These univariate analyses did not reveal any differences between the two groups in terms of first-day returns and the leverage ratio. Underpricing measured by the first-day returns is higher in firms with fewer outside directors (38.39%) than in firms with a higher proportion of outside directors (31.41%), even though the finding is statistically insignificant. The leverage ratio at one year after an IPO is lower in firms with a fewer number of outside directors. This can be explained by the fact that firms with fewer outside directors issue a greater number of new shares at the time of IPO.

C. Board diversity and IPO underpricing

An IPO issuance provides firms an incentive to maximize the offering price in order to reduce underpricing and thereby increase capital gains. Nevertheless, an IPO can fail if the offering price is higher than that of the market price. Thus, in a firm commitment issue, an underwriter may have incentives to sell shares below the market price to ensure the sale of all the shares. Both the number of shares to be sold and the offering price are set by a firm's management and the underwriter. On the first trading day, the offering price can be compared to the closing price to determine the success of the IPO. Indeed, IPOs are underpriced to ensure that the issue is fully subscribed, and the price is expected to increase on the offering day.

Table 5 shows the regression results of equation (1). According to the results, there is a significant negative relationship between IPO underpricing and board diversity, as measured by board size and the number of outside directors. All the coefficients of the board size in models (1) to (3) are negative and

	Underpricing _i = $\alpha_0 + \beta_1 Board$ Diversity _i + $\sum_{j=1}^{n} \alpha_j X_i + \epsilon$							
Variables		Depend	lent variable: Un	d_PRC (first-day	returns)			
variables	(1)	(2)	(3)	(4)	(5)	(6)		
Bsize	-0.1882*	-0.1906*	-0.18722*					
	(-1.77)	(-1.82)	(-1.85)					
Outside				-0.1644***	-0.1645***	-0.1535***		
				(-2.73)	(-2.77)	(-2.70)		
WOMAN	0.4054	0.4061		0.4619	0.4621			
	(1.20)	(1.20)		(1.37)	(1.37)			
AGE_SD	-0.0641	-0.0004	0.0005	0.0003	0.0003	0.0013		
	(-0.90)	(-0.06)	(0.08)	(0.04)	(0.04)	(0.18)		
CAPEX	-0.0605	-0.0596	-0.0638	-0.0709	-0.0708	-0.0711		
	(-0.52)	(-0.52)	(-0.56)	(-0.61)	(-0.62)	(-0.62)		
YEAR	-0.0003			-0.0001				
	(-0.12)			(-0.01)				
LEV	0.0002	0.0002		0.0007	0.0007			
	(0.18)	(0.17)		(0.53)	(0.53)			
CEO_A	0.0020	0.0019	0.0017	0.0003	0.0027	0.0025		
	(0.64)	(0.63)	(0.57)	(0.86)	(0.89)	(0.85)		
Constant	0.3163	0.3187	0.3387	0.2461	0.2462	0.2767		
	(2.05)	(2.09)	(2.24)	(1.58)	(1.59)	(1.81)		
R-squared (N=470)	0.0110	0.0110	0.0077	0.0201	0.0201	0.0158		

Table 5. Regression results of board diversity on IPO underpricing

*, **, *** are significant at 1%, 5%, 10%, respectively. Parentheses are t-statistics.

statistically significant at the 10% level. All the coefficients of the number of outside directors are also negative and significant at the 1% level. These negative relationships mean that the first-day returns decrease with an increase in board diversity, which supports hypothesis 1-increased board diversity (larger board size and a higher proportion of outside directors) does indeed lead to a decrease in IPO underpricing (lower first-day returns).

Our regression results show that board diversity is associated with a higher shareholder value. Contrary to our prediction, we find no significant relationship between IPO underpricing and other diversity variables, such as WOMAN or AGE SD. The results support the notion that highly diverse boards provide an incentive to maximize the offering price, thereby benefitting the shareholders.

D. Board diversity and firm value

We also analyzed the positive relationship between board diversity and firm value. Table 6 presents the regression results of board diversity on firm value. Our findings indicate that, after an IPO, a firm's value is positively influenced by both the board size and a higher proportion of outside directors. All the coefficients of board size in regression models (1) to (3) are positive and statistically significant at the 10% level. The number of outside directors has the same relationship with Tobin's Q, and this relationship is statistically significant at the 1% level. This supports hypothesis 2-increased board diversity (larger board size and a higher proportion of outside directors) does enhance firm market value following an IPO.

The regression results in Table 4 also show that

		n	anandant variabla	Value (Tohin's	0)	
Variables	(1)	(2)		(4)	(5)	(6)
	(1)	(2)	(3)	(4)	(3)	(0)
Bsize	0.0685**	0.0659**	0.0784**			
	(2.24)	(2.15)	(2.57)			
Outside				0.1493***	0.1431***	0.1698***
				(3.59)	(3.44)	(4.13)
WOMAN	0.5617***	0.5618***		0.5037***	0.5061***	
	(3.74)	(3.73)		(3.35)	(3.36)	
AGE_SD	-0.0032	-0.0059		-0.0045	-0.0074	
	(-0.23)	(-0.43)		(-0.33)	(-0.54)	
CAPEX	0.2450	0.2680		0.2606	0.2855	
	(1.11)	(1.22)		(1.20)	(1.31)	
YEAR	-0.0069		-0.0072	-0.0077*		-0.0082*
	(-1.58)		(-1.63)	(-1.76)		(-1.88)
LEV	-0.0068**	-0.0069**	-0.0084***	-0.0078***	-0.0079***	-0.0093**
	(-2.49)	(-2.53)	(-3.09)	(-2.86)	(-2.89)	(-3.46)
ROA	0.0280***	0.0284***	0.0274***	0.0266***	0.0271***	0.0258***
	(3.99)	(4.04)	(3.85)	(3.81)	(3.88)	(3.65)
CEO_A	-0.0039	-0.0063	-0.0048	-0.0066	-0.0091	-0.0079
	(-0.67)	(-1.09)	(-0.82)	(-1.12)	(-1.57)	(-1.36)
NSHR	-1.6042***	-1.7051***	-1.6142***	-1.6670***	-1.7762***	-1.6908**
	(-4.23)	(-4.55)	(-4.21)	(-4.43)	(-4.78)	(-4.45)
Constant	1.9422	2.0104	2.0600	2.2871	2.3479	2.4472
	(6.15)	(6.42)	(6.56)	(7.53)	(7.76)	(8.12)
R-squared (N=470)	0.1656	0.1611	0.1381	0.1634	0.1739	0.1569

Table 6. Regression results of board diversity on firm value

*, **, *** are significant at 1%, 5%, 10%, respectively. Parentheses are t-statistics.

the presence of female directors is associated with a higher firm value. We find that Tobin's Q is positively related to the dummy variable of *WOMAN*, and that all the coefficients of *WOMAN* in regression models are positive and statistically significant at the 1% level. This result supports the view that a board's gender diversity and firm value are positively related. The coefficients of *CAPEX* and *ROA* are all positive. In particular, the coefficients of *ROA* are statistically significant in models (1) to (6). These findings are consistent with our expectation that growth opportunities (higher *CAPEX*) are related to a higher firm value. The results also support the notion that more profitable (higher *ROA*) firms have a higher market value. Our overall results suggest that board diversity leads to an increase in firm value. In addition, too much debt (*LEV*) is shown to decrease firm value following IPOs.

One interesting finding depicted in Table 6 is that firms issuing a large number of new shares at the time of an IPO have a low firm value after the IPO. The negative relationship between firm value and the proportion of issuance of new shares (*NSHR*) might be the result of overinvestment—that is, instances when firms generate more than the required level of equity capital.

E. Test for robustness: subsample of smallsized firms

Board diversity (board size and the number of outside and female directors) is closely related to firm size, which is measured by total assets. The work of Shan and McIver (2011) demonstrates that independent directors have a positive impact on firm performance only in larger firms. Because free cash flow is not excessive for small companies, the possibility of agency problems is low, and the role of independent directors is limited. If this is in fact the case, it is likely that in a subsample of small-sized firms, board diversity is less related to underpricing. Also, the impact on corporate value after IPO events in a subsample of small-sized firms may be different from the overall sample. Therefore, in this section, we repeat the previous tests on a subsample of small-sized firms for the same sample period. The subsample of small-sized firms consists of 235 firms (half of our entire sample).

Table 7 presents the results of regression analyses

for the subsample of small-sized firms. As expected, all the coefficients of board diversity in the underpricing regression show insignificant results. It is interesting to note that *CAPEX* is statistically and negatively related to *Und_PRC*. When firms have more capital investment, they tend to establish a higher offering price.

Estimates of coefficients in the firm value regression are mostly similar in sign to the estimates of coefficients in the earlier tests (with the dependent variable measured by Tobin's Q). This means that board diversity enhances firm value following an IPO. However, the significance level is lower than in regressions with the full sample. The impact of board diversity in small firms on *Value* seems to be weaker than the impact of board diversity on *Value* in the full sample of firms. The negative relationship between firm value and the proportion of issuance of new shares (*NSHR*) is also found.

In sum, board diversity is positively related to firm value. In determining offering prices for IPO events (in other words, costs to existing shareholders), however, board diversity enhances the wealth of existing shareholders

Dependent Variable	Und	_PRC (underpri	cing)	I	Value (Tobin's Q))
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Bsize	-0.0357			0.1213*		
	(-1.20)			(1.81)		
Outside		0.1964			1.4839***	
		(1.02)			(3.51)	
WOMAN			0.1365			0.4885*
			(1.13)			(1.80)
CAPEX	-0.3203*	-0.2841	-0.3108*	0.2084	0.3512	0.1624
	(-1.69)	(-1.49)	(-1.64)	(0.49)	(0.83)	(0.32)
LEV	0.0036	0.0037	0.0043*	-0.0131**	-0.01245**	-0.0110**
	(1.49)	(1.56)	(1.74)	(-2.45)	(-2.37)	(-2.00)
NSHR	0.1454	0.1757	0.1379	-3.7423***	-3.9196***	-3.9379***
	(0.34)	(0.41)	(0.32)	(-3.92)	(-4.19)	(-4.10)
Constant	0.5717	0.4868	0.4422	1.8296	2.6569	2.3207
	(1.70)	(1.52)	(1.39)	(2.43)	(3.77)	(3.26)
Other Variables	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (N=235)	0.0050	0.0247	0.0257	0.1054	0.1390	0.1047

Table 7. Regression results for subsample of small-sized IPO firms

*, **, *** are significant at 1%, 5%, 10%, respectively. Parentheses are t-statistics.

only in larger firms. The possible role of board diversity is limited in small firms because there is little room for underpricing. Small firms that need more capital investments seem to set offering prices near to fair levels with or without diverse boards.

VII. Discussion

This study examines the hypothesis that the board of directors influence the rational decision-making of a company. The reasons for choosing Korean IPOs are as follows. First, an IPO is one of the most important decisions in the life cycle of a company. In particular, the decisions involved in establishing the offering price (or underpricing) are selected as the subject of this study because pricing is both an important factor in the success of the IPO and costs to existing shareholders.

Second, there are claims that boards of directors of firms in Korea do not function reasonably and instead tend to cater to the opinions of CEOs. This study attempts to show that diversity in the boards of directors plays an important role in corporate decisionmaking in an emerging market. Our findings confirm that diverse boards maximize the wealth of existing shareholders in Korea. The greater the diversity in a board, the lesser is the underpricing. This study confirms that the larger proportion of outside directors on the boards of directors in Korean companies, the greater the board size and the function. The proportion of female directors also bolsters the diversity of the board.

Third, the diversity in boards of directors has positive effects on the value of firms following IPOs. In comparison to the results regarding underpricing, the analysis of the impact of board diversity on corporate value is statistically significant and clear. One new interesting fact is that when a company issues a larger proportion of new shares, it has a negative impact on the long-term firm value. This may be a dilution effect on existing stocks and/or due to the excess funding of IPO firms. We think it is necessary to examine the possibility of overinvestment.

This study used various variables to measure board diversity and control variables. However, it still has some limitations in that the effects of IPO underpricing and corporate governance have not been completely analyzed. Therefore, we expect that further studies on the following variables will be conducted to provide additional implications. It could be possible to determine whether a member of the board of directors is from an academic field or not. In Korea, people from academic fields frequently serve as board members. If data are available, it is worthwhile to consider whether a board member is from an academic field as an additional measure of board diversity. In addition, the reputation of investment banks sponsoring the issue, the impact of venture capitalist backing, and/or ownership of the CEO can also be used as a reliable indicator of the quality of IPOs.

VIII. Implications

A. For theory development

This study has implications for theories of corporate governance in the body of literature in financial decisionmaking. It analyses how diversity in boards of directors plays a critical role in determining offering prices of IPOs, together with how diversity affects the future value of firms. The implication of our study is that the more diversity in a board, the more likely the board is to make rational decisions. Theoretically, our findings imply that a diverse board of directors stands to reduce the agency problem for CEOs regarding IPO underpricing or underwriters' incentives to lower the risks of firm commitment.

The results of this study reveal that firm value is enhanced by board diversity as measured by board size, proportion of outside directors, and presence of female directors. One new finding is the negative relationship between firm value and the proportion of issuance of new shares (*NSHR*). This may be explained by the fact that a firm issues a lot of new shares, so the higher the NHSR, the greater the dilution effects on existing shareholders. This, in turn, negatively impacts firm value. In addition, the financing of excessive capital can imply excessive investment (overinvestment) beyond an appropriate level of investment. This may be due to an agency problem with management. Because managers have incentives to increase the size of a firm through excessive investment, exerting managerial control by virtue of board diversity has the potential to reduce this agency problem and increase firm value. Indeed, this analysis may be applicable not only to IPOs but also to seasoned equity offerings (SEOs). If higher issuance of new shares through SEOs leads to a decrease in firm value, however, then separate analysis of the firm's investment activities is necessary.

The work of Shan and Mclver (2011) asserts that outside directors have a positive impact on firm performance only in large companies. In small firms, the opportunistic behavior of CEOs is less likely to occur because free cash flow tends to be scarce in small IPO firms. If the agency problem can be controlled by diversity in the board of directors, then little statistical significance is implied between board diversity and IPO underpricing in small firms that suffer from capital shortages. Analyses tests in our subsample of small-sized firms confirm the proposed expectation. However, the value of firms following IPOs is shown to have a strong positive relationship with board diversity, even in our subsample. The implication of a positive relationship between firm value and board diversity is that management decisions are influenced by boards' diversity structure. This positive relationship is also confirmed in the performance of IPO companies, which may be strongly influenced by external environmental factors.

B. For business and management practice

Analyzing the influence of diversity in boards of directors on decision-making by managers improves corporate governance to maximize shareholder wealth. Thus, this study has great implications for management practice. The long-standing concern of stock investors is that managers are plundering shareholders' interests for their own interests—or that shareholders' interests are violated by managers' irrational decisions. Therefore, having a diverse board to act as a means to alleviate these types of concerns has terrific implications from an investor's point of view.

IPO underpricing plays a positive role in increasing the IPO's chances of success and reducing an underwriter's marketing costs, but low offering prices are costs to existing shareholders. Therefore, managers who aim to maximize shareholder wealth must set an appropriate offering price. If managers have personal incentives to expand their company size by overinvesting any capital raised through the issuance of new shares, then the success of an IPO will be more important than fair pricing for shareholders. Accordingly, this study offers strategies in how to organize boards of directors in firms pursuing IPOs. In order to properly establish an offering price, it is necessary to increase diversity in directors. Fortunately, diverse boards will also increase firm value following the IPO.

IX. Conclusion

This study elucidates the relationship between board characteristics and shareholder wealth by analyzing data collected from a sample of Korean IPO companies. Specifically, we investigate the impact of board size and the number of outside directors on IPO underpricing and long-term firm value following an IPO. Using first-day returns and Tobin's Q as a measure of underpricing and firm value, respectively, we find that larger and more diverse boards contribute to maximizing shareholders' wealth. Board gender diversity also increases the form's market value. Firms with female directors have a higher Tobin's Q ratio. Firm value is further determined by growth opportunities and firm profitability.

Our findings suggest that, at least for IPO firms, an increase in board diversity can preserve shareholder value. In the case of other independent variables, the lack of statistical significance can be attributed to the small sample size. Particularly in the regression analysis for underpricing, there is insignificance in the coefficients of the other independent variables. For example, because there are very few female directors in Korea, even in publicly traded companies, the use of the dummy variable for female directors likely affected the accuracy of the results. A larger sample, including more companies with diverse boards, might have rendered more precise results. In Korea, any differences in board members' ethnic backgrounds, gender, levels of education, and age seem to be lesser than those in other societies, which makes this research area interesting. In general, future studies should examine more board characteristics in relation to IPO underpricing.

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