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Essays on the Capital Market Consequences of Accruals Quality

발생액 품질이 자본시장에 미치는 영향에 대한 연구

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ABSTRACT

Essays on the Capital Market Consequences of Accruals Quality

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This dissertation is comprised of two related but independent essays on the capital market consequences of accruals quality. The first essay focuses on the effect of accruals quality on the equity market by using initial public offering (IPO) firms. The second essay investigates how the bond market participants respond to accruals quality. Below, I briefly explain the two essays in my dissertation.

The first essay examines the role of accruals quality in determining the underpricing of IPO. Further, I investigate the influence of the regulatory policies on the IPO market on the relation between accounting quality and IPO underpricing in Korean firms. I test the hypotheses which predict that poor accruals quality raises uncertainty about a firm's financial condition for outside investors, thererby increasing the level of underpricing, but only in the absence of the regulatory policies that limit the responsibility and discretion of underwriters. Using 222 IPOs in Korea over the 2003-2011 period, I show that IPOs are underpriced less for firms that produce high quality accounting information, only in the deregulation period. This finding persists after controlling for other firm-specific factors that affect IPO underpricing, and is robust to a battery of sensitivity analyses.

In the second essay, I investigate whether good accruals quality affects the degree of consensus on bond ratings among credit rating agencies. Prior research shows evidence that firms with good accruals quality have less information risk and thus reduce firms' cost of capital. Distinct from prior studies that focus on the equity market, I examine the bond market consequences of accruals quality. Specifically, I examine whether the quality of accounting information, proxied by accruals quality, reduces disagreement about bond ratings (i.e., split bond ratings) among the three rating agencies in Korea. I test the hypotheses which predict that poor accruals quality raises information uncertainty about a firm's financial condition for creditors, thererby increasing split bond ratings among rating agencies. Using 2,468 observations for public bonds in Korea over the 2000-2010 period, I show that better accruals quality is associated with lower frequency and magnitude of split bond ratings by credit rating agencies. This finding persists after controlling for other firm-specific factors that affect split ratings, and is robust to a battery of sensitivity analyses.

***Keywords*: accruals quality, initial public offerings, underpricing, regulations, split bond ratings, bond market**
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Essay 1
Accruals Quality, IPO Underpricing, and Regulatory Policies: Evidence from Korea

I. Introduction

Few events mark a more important watershed in the life of a company than initial public offerings (IPO)[1] which provide access to public equity capital. Voluminous literature documents that firms going public earn significant and positive first-day returns in which the share prices jump substantially on the first day of trading, a phenomenon referred to as IPO underpricing. The systematic increase in the offer price on the first day of trading is not only found in the U.S. (Stoll and Curley 1970; Logue 1973; Ibbotson 1975), but also in a range of countries including European, Asia-Pacific, and Latin American countries (Loughran et al 1994; Ljungqvist 2007).

The findings of the IPO literature offer various theoretical explanations for IPO underpricing and, most considerably, suggest that underpricing arises from information asymmetries among participants in the IPO process. For example, Rock (1986) suggests that when investors are provided with different information sets, underpricing is necessary to induce less informed investors to bid for IPO shares in equilibrium. The asymmetric information theories receive considerable empirical support. Ljungqvist (2007, p. 380) provides a survey of empirical evidence that supports the conclusion that information asymmetries "have a first order effect on underpricing." In a more recent international study, Boulton et al. (2011) document that higher information asymmetries, proxied by country-level earnings quality, engenders high IPO underpricing.[2]

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[1] An initial public offering (IPO) is described simply as an "offering", which is when a company (called the issuer) issues its common stocks or shares to the public for the first time.

[2] My study differs from Boulton et al. (2011) in several respects. First, I use a single country setting in which more precise firm-level accruals quality measure is estimated. Boulton et al. (2011) use country-level proxies for earnings quality which capture the general quality of accounting by country, rather than by each firm. To my knowledge, I am unaware of any existing studies that directly examine the impact of accruals quality on IPO underpricing in a single country using this refined, improved measure of accounting information quality. Secondly, while the international study in Boulton et al. includes Korea as one of the countries,

To validate the asymmetric information hypothesis for IPO underpricing, researchers in the finance literature employ ex-ante measures of uncertainty such as firm age, sales, and offer price, or ex-post measure such as the standard deviation of stock returns and stock bid-ask spread, which are available only after the initial price is observed.[3] However, none of these variables has a strong theoretical link to information asymmetry between issuers and outside investors. It is likely that these variables capture other aspects beyond asymmetric information of the initial offering. For example, stock return volatility is a widespread measure of uncertainty and is influenced by industry- and economy-wide shocks, for which firm managers are unlikely to have a significant information advantage relative to other investors (Lee and Masulis 2009).

To better capture the level of information asymmetry between issuers and outside investors, this paper uses accounting quality as a more precise measure for uncertainty of a firm's information. Accounting statements are the primary source of information about firm performance available to outside investors, therefore, its quality should be directly related to investor uncertainty about a firm's financial health and future performance. Thus, the quality of a firm's accounting information should serve as a reasonable proxy for investor uncertainty or the level of information asymmetry between managers and outside investors (Lee and Masulis 2009).

Accounting information quality is measured by various approaches. While

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the time period runs from 1998 to 2008 when the sample in this study covers the period 2001-2011 (I test extended period in the robustness test) which includes the market stabilization, regulation, and deregulation periods. Finally, using more recent time period enables me to disentangle the effect of the regulatory policies on the IPO market, an institutional setting unique to Korea, on the relation between accruals quality and IPO underpricing. Thus, the implications of the results of this study compared to those of Boulton et al. (2011) are different.

[3] In Table 3.2, Jenkinson and Ljungqvist (2001) provide a useful summary of variables used to measure uncertainty in the IPO process.

early accounting literature uses earnings manipulation (e.g., discretionary accruals) as the key measure of information quality, recent accounting literature focuses on uncertainty about a firm's operating fundamentals and, specifically, the extent to which earnings (accruals) map into cash flows. In other words, a poor mapping of accruals into cash flows reduces the information content of reported earnings and results in reduced accruals quality (hereafter AQ). If investors differ in their ability to process earnings related information, then poor earnings quality can result in differentially informed investors and thereby exacerbate the information asymmetry in financial markets (Diamond and Verrecchia 1991; Kim and Verrecchia 1994). This claim is further supported by Bhattacharya et al. (2013) who document a direct association between accruals quality and information asymmetry, confirming the validity of using AQ as the proxy for information asymmetry.

It follows that, combined with the role of information asymmetries in IPO underpricing, as accruals quality deteriorates, information asymmetry between managers and investors should widen. Theoretical models predict that differential information between issuers and investors increases the adverse selection risk for outside investors (Kyle 1985; Glosten and Milgrom 1985). Thus, lower accruals quality is expected to induce increased investor risk aversion toward investing in these firm's IPOs. As a result, underwriting IPOs with poor accruals quality is more risky and costly, thus leading to higher underpricing.

In sum, I predict that IPO underpricing and accounting information quality to show adverse relations. Further, I take advantage of the institutional background in Korea to investigate whether such relation remains stable in a regulated IPO market. Specifically, to understand whether and how the regulatory policies and the subsequent deregulation efforts in the IPO market

affect the role of information asymmetry in determining IPO underpricing, I divide the full period ranging from 2003 to 2011 into two periods and examine the relation separately for 1) the regulation period (September 2003 - May 2007) and 2) the deregulation period (June 2007 - 2011).

In the early 2000s, the Korean primary issue market adopted several regulations which limit the discretion of underwriters. The regulations required underwriters to use a pre-determined methodology in calculating the offer price of new shares and in distributing the new shares to investors.[4] The practice of using the pre-determined methodologies for computation of the offer price and for share allotment continued until May 2007. The pre-determined methodology is based on information given by the participants (i.e., institutional investor) of the book-building process and consists of the three variables, quantity offered, offered price, and weighted credit rating of that institutional investor. Studies on the book-building process document that there is a substantial difference in the maximum and minimum offered price and that some participants do not determine the price based on the intrinsic value of the IPO firm (Kim and Khil 2001).

During that time, the Korea Securities Dealers Association (hereafter KSDA) imposed a put-back option provision from September 2003 to May 2007 in an effort to protect investors. The put-back option gives investors the

[4] The enforcement of regulations for underwriters to use pre-determined methods in computing the offer price and in distributing the shares to investors remained until June 2002. Due to concerns about excessively limiting the discretion of underwriters, the regulations on share price determination and share allotment were abolished in 2002. However, the government instead required the underwriters to disclose in detail the mechanisms for determining the pricing of new shares and the share allotment process in the preliminary IPO prospectuses prior to the IPO date. Due to the incentives not to deviate from industry practice, the underwriters continued using the same pre-determined methodologies even after the regulations were repealed. As a result, the disclosure policy, which was effective from July 2002 to May 2007, forced the underwriters to maintain its old practice of using the pre-determined methods in computing the offer price and in distributing shares. Such behavior is documented in Lee and Shin (2013).

right to sell their stocks back to the underwriters within the first month of trading at 90% of the offer price if the price falls below a certain level. Equipped with the put-back options, the downside risk of investing in IPO stocks is essentially protected as investors can recover a substantial part of their investment from the underwriters if the price of IPO stocks falls below 90% of the offer price. Thus, underwriters had to exert immense effort to ensure that the offer price is not set too high to avoid the put-back option from being exercised.[5]

Throughout this regulation period ranging from September 2003 to May 2007, the put-back options along with the restrictions on pricing and share allotment limit the underwriters' ability to freely apply their professional knowledge and know-how in determining the offer price and to be in full charge of the IPO process. Under the regulations, underwriters have no urgent need to evaluate firm's intrinsic value thoroughly (i.e., by investigating the accruals quality of the IPO firms) in their pricing decisions but simply follow the given rules to determine the price. Underwriters do not put forward efforts to distinguish between good firms (e.g., good AQ firms) and bad firms (e.g., poor AQ firms). Thus, the initial offer price is determined based on the average values of the good and bad firms. Further, due to the put-back options, underwriters have the incentives to lower the overall offer price to avoid the options from being exercised. Thus, the final offer price during the regulation period is determined as the average value of good and bad firms, subtracted by the average value of the put-back option for good and bad firms.[6]

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[5] The report titled "Plans for globalizing the IPO market" issued on May 2007 by the Financial Supervisory Services (FSS, the equivalent of the Securities and Exchange Commission (SEC) in the U.S.) shows that the offer price of IPOs is, on average, set as approximately 72% of its intrinsic value.

[6] The put-back option values for good and bad firms are different. The value of a put-back option reflects the risk that the price of the IPO stock might fall below the offer price. In other

As a result, during the regulation period (September 2003 - May 2007), underwriters set the offer price equal for IPOs of good AQ firms and poor AQ firms, inducing higher magnitude of underpricing for firms with good AQ. On the IPO date, as investors collect and exchange information about the IPO firms in the market place (e.g., price recovery process), IPO firms with good AQ will experience a large price run-up while IPO firms with poor AQ will experience only a small increase in price as information about AQ is impounded in price. I empirically test this prediction as my first research hypothesis.

Notably, the prediction of the relation between accruals quality and IPO underpricing during the deregulation period is opposite to that during the regulation period. Recognizing the need to move closer toward the practices in global IPO market, in May 2007, the FSS abolished the put-back option and loosened other regulatory measures, marking the beginning of deregulation of the Korean IPO market. Starting in June 2007, underwriters are allowed to exercise discretion in determining the offer price and in the share allotment process.

As a result, underwrites are incentivized to investigate and apply the intrinsic value of the IPO firms to the offer price. In the process of the investigation, underwrites have the opportunities to incorporate accruals quality into the offer price and appropriately attach high price to good firms (e.g., high AQ) and low price to bad firms (e.g., low AQ). In order to induce selling of bad firms, the underwriters offer more discount to bad firms which results in higher underpricing for such firms. Thus, during the deregulation period (June 2007 - 2011) in which the IPO market in Korea is much more closely resembling the

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words, an IPO firm with poor AQ (e.g., bad firm) has a higher risk of its price falling below the 90% level, so the true value of the put-back option for bad firm has a higher option value compared to firms with high AQ (e.g., good firm). The value of a put-back option serves as a proxy for the risk that the underwriters face (Joh and Lee 2007).

practices of global IPO market, I expect IPO firms with poor accruals quality to experience greater underpricing. I develop this prediction as the second research hypothesis.

To test the predictions, I analyze a sample of 222 IPOs in Korea during the September 2003 - May 2007 regulation and the June 2007 - 2011 deregulation periods. Using an accruals-based measure of accounting quality (Francis et al. 2005), I find that poor accruals quality is significantly and incrementally associated with higher IPO underpricing during the deregulation period. However, no significant association or marginally the opposite relation is observed during the regulation period, confirming that AQ does not play a role in setting the offer price when restrictive measures are in place. To assess the robustness of my findings, I examine a variety of alternative accruals quality measures. The main results are robust to taking into account potential endogeneity problems, sample selection bias, and the effect of ownership of large shareholders.

Given my focus on the relation between accruals quality and IPO underpricing, this study contributes both to the literature on the effect of accounting quality on market anomaly. First, this paper complements recent studies that investigate the impact of information quality on IPO underpricing (Hanley and Hoberg 2010; Loughran and McDonald 2013) by showing that variation in accounting quality explains at least some of the variation in IPO underpricing. This study lends support to the argument that information asymmetries between managers (or underwriters) and outside investors, is a significant cause of IPO underpricing and that such effect is only observed in the absence of the regulatory policies. Although the generalizability of this study could be an issue as a result of unknown institutional differences, my findings should be of interest to standard-setters, practitioners, and

academicians concerned with the consequences of regulatory policies that limit the role of underwriters such as the put-back option on the IPO market.

The rest of the paper proceeds as follows. In Section 2, I describe the institutional background, review the literature, and develop hypotheses on the relation between accruals quality and IPO underpricing for the regulation and deregulation periods. Section 3 presents the research design and specifies the empirical models. In Section 4, I describe the data, variables, and sample characteristics. Section 5 and 6 present the main empirical results, and the results of robustness tests that show further evidence supporting my hypothesis, respectively. Finally, I present summary and concluding remarks in Section 7.

II. Institutional Background, Literature Review, and Hypotheses Development

2.1 Institutional Background

It is required that all Korean IPOs are placed through firm commitment, where the underwriter guarantees the sale of the issued stock at an agreed-upon price. This is in contrast to the institutional setting in the U.S. in which issuers have alternative choices such as the best effort contract underwriting. In Korea, to transform from a private company to public company, there is a list of procedures that need to be followed. First, a firm prepares preliminary prospectus and applies for a stock exchange listing. Underwriters then conduct a review of the company and its operations to ensure that the prospectus provides full disclosure, a process that involves discussion with senior management, inspections of significant operating facilities, and review of the company's present and future financial information.

Once the prospectus has the approval from the securities regulators, the underwriter can coordinate the pricing of the offering. Based on the reviews and

valuations of the company, the underwriter determines a preliminary offer price. In the next phase, the underwriter undergoes the “book-building” process and gauges investors demand for the IPOs to finalize the offer price. In this phase, the institutional investors express opinions about their intention to purchase in term of the amount of shares and the price, revealing their request for the offering. The IPO process described so far refers to the most current IPO process in Korea as the Korean IPO market has continuously undergone numerous changes and development over the past two decades, especially in the book-building process and in terms of the flexibility and discretion allowed for underwriters.

The book-building system in Korea was implemented in 1999, laying the groundwork for more globalized and active IPO market. In the U.S., book-building is the method used by a majority of investment bankers. Under this system, they seek to gauge demand for the IPO during road-shows held to promote the IPO among institutional investors. The indications of interest received are used by the underwriter to price the new share offering, and also to determine how these new shares will be allocated among investors. In other words, the book-building method allows the underwriter to freely select investors for the IPO, set the offer price, and determine the allocation of shares in the U.S. After the new shares begin trading on the market, one of the U.S. underwriters’ large responsibilities is to support the price of the new issues through market-making activities. These include the decision on whether to use the overallotment option (i.e., green shoe), which grants an option to the underwriter to purchase from the company within 30 days an additional 15 percent of the new shares at the offer price. The overallotment option allows the underwriters in the U.S. to provide stronger buying support without being exposed to excessive risk. U.S. IPOs are characterized by pervasive underwriter

stabilization where the lead underwriters are the most active market-maker or liquidity providers, handles the majority of the trading volume (Aggarwal and Conroy 2000) and takes substantial profits (23 percent of the compensation after three months of trading) from market-making activities (Ellis et al. 2000). Ellis et al. (2002) additionally report that these market-making activities continue to be effective long after the offering for Nasdaq-listed IPOs. Further, underwriter stabilization itself may explain IPO underpricing, by reducing the occurrences of initial negative returns (Ruud 1993).

The IPO process is quite different for Korean IPOs in the book-building process as well as market-making activities. In contrast to investor selection and discriminatory share allocation practices exercised by the underwriters in the U.S. book-building process, the underwriter in Korea had restrictions on the allotment of shares and has to price the new offering based on pre-determined calculation methods in the early 2000s. For example, the underwriters had to apply the following formula to set the initial offer price:

$$\text{Weighted average initial offer price} = \frac{\sum(\text{Quantity offered x offered price x weighted credit rating})}{\sum(\text{Quantity offered x weighted credit rating})} \qquad (1)$$

where the numerator is the sum of the product of quantity, and price offered by each institutional investor participating in the book-building process, and the weighted credit rating of that institutional investor; and the denominator is sum of the product of the quantity of shares offered by each institutional investor participating in the book-building process, and the weighted credit rating of that institutional investor; and the weighted credit rating is determined based on the ability, capital resources, and IPO lock-up period of the underwriter.

In June 2002, the FSS abolished the above requirements on pricing and distributing shares, but instead imposed a disclosure requirement on the

underwriters in which underwriters are required to reveal to the public the pricing mechanism and distribution process in detail prior to the IPO date. Due to the incentives not to deviate from industry practice, the underwriters continued using the same pre-determined methodologies even after the regulations were repealed. The disclosure policy, which was effective from July 2002 to May 2007, forced the underwriters to maintain its old practice of using the pre-determined methods in computing the offer price and in distributing shares (Lee and Shin 2013).[7]

In addition to the regulatory measures described above, in September 2003, the KSDA, which defines security-issuance regulations in Korea, implemented a put-back option provision in order to control the processes over which the offer price is determined and to provide safeguards for investors. The put-back option gives investors the right to sell their stocks back to underwriters within the first month of trading at the 90% of the offer price. In short, the underwriters are obligated to buy back the IPO shares from investors if the stock price falls below 90% of the offer price, which increases the burden on the part of the underwriters, a practice that is in sharp contrast to the overallotment option granted to underwriters in the U.S. Equipped with the put-back options, investors investing in IPO stocks are essentially protected as they can recover a substantial part of their investment if the price of IPO stocks falls below a certain level. Therefore, underwriters had to exercise extra caution to ensure that the offer price is not higher than their bearable price level or is set at a level that avoids the exercise of the option. Essentially, these regulatory

[7] Another difference in the book-building process between Korea and the U.S. is that the underwriters in Korea are required to open the book-building to all institutional investors while underwriters in the U.S. can selectively choose the institutional investors to take part in book-building, an institutional difference which remains to this date. These regulatory policies in Korea prohibit the underwriters from exercising flexibility over the IPO process in setting the offer price and distributing shares.

policies severally shrunk the underwriters' ability to take full control of the IPO process and mitigated the incentives to incorporate the estimated intrinsic value into the offer price of the IPO firm.

The problems of these regulatory policies are well summarized by the words of Hong-Ryul Jun, former Senior Deputy Governor of FSS, "the current regulations on the IPO market have taken away the power and authority of the underwriters to participate in the IPO process and turned them into mere brokers who do not take responsibility for their actions."[8] Relatedly, the empirical findings suggest that the regulations (i.e., the put-back option) resulted in severe mispricing of IPOs (Joh and Lee 2007; Lee and Nam 2009; Shin 2010; Kim and Sonu 2012), obstructing the fair pricing of initial shares, and thus hurting the interest of issuers (Joh and Lee 2007; Cho and Byun 2012). They argue that the existing regulations should be revised to bring about greater autonomy of the IPO market, to incentivize underwriters to "mind the store", and to help market participants make more careful investment decisions.

In response to the call for the abolishment of the regulations and in line with the policy toward globalization of the Korean IPO market, there were three major changes that led to deregulation of the IPO market in 2007. In June 2007, the FSS repealed the put-back option and disclosure requirement for the pricing of new issues and share allotment process. Underwriters are no longer obliged under 1) the put-back option, or to use the pre-determined methodologies 2) for pricing of initial shares, and 3) for distributing the shares to investors. In other words, underwriters no longer have to compensate for the dip in initial price returns and are allowed to exercise flexibility and discretion over the pricing of

[8] The remarks are excerpted from the comments given by Hong-Ryul Jun on May 30, 2007 and can be found in the news article from the following link,
" http://www.edaily.co.kr/news/NewsRead.edy?SCD=JA21&newsid=02151686583134168&DCD=A00102&OutLnkChk=Y".

IPOs and the share distribution process, thus more closely resembling the U.S. book-building environment.

These changes in the institutional setting in Korea enable me to gain insights on the policy implications on the IPO market, focusing on the role of information asymmetries in amplifying underpricing around the implementation of regulatory policies. By separating the effect of the regulatory policies on the underwriters' role, I can better validate the asymmetric information hypothesis for IPO underpricing.

2.2 Literature Review and Hypothesis Development

A number of theories have been put forward to explain first-day gains to new issues, which are virtually observed in all of the world's stock markets. The prevailing hypotheses for IPO underpricing are the asymmetric information hypothesis (Baron 1982), monopsony-power hypothesis (Ritter 1984), the signaling hypothesis (Titman and Truman 1986), and the lawsuit avoidance hypothesis (Tinic 1988).[9] Among the four hypotheses for IPO underpricing, information asymmetry models play a dominant role (Ljungqvist 2007) and receive considerable empirical support. For instance, Baron (1982) presents a model that demonstrates that the adverse selection problems resulting from the informational asymmetry explain the underpricing of new issues. Rock (1986) shows that when investors have different information sets, underpricing is necessary to induce less informed investors to bid for IPO shares in equilibrium.

[9] Other information-based underpricing theories assume different participants in the IPO process to possess superior information. For example, in Baron (1982)'s model, investment bankers know more about an IPO firm's true value than does the issuer, and thus underpricing becomes a solution to the resulting principal-agent problem. In contrast, Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989) argue that issuers use their information advantage to signal firm quality, whereas in Benveniste and Spindt (1989) underpricing induces well-informed investors to reveal what they know before the offer price is set.

Ljungqvist (2007, p. 380) concludes that information asymmetries "have a first order effect on underpricing." In Korea, the asymmetric information hypothesis receives significant empirical support in explaining underpricing while other explanations such as information-based theories or investor rationality story may also be relevant to a subset of IPOs (Choi 2011).

The initial papers on the causes of underpricing are largely based on analytical models, providing support on the role of information asymmetry on underpricing. A line of studies that investigate the role of accounting information in the IPO process show mixed evidence. Teoh et al. (1998) report that first-time issuers report unusually high level of accruals and experience subsequent low stock returns. However, using U.K. data, Ball and Shivakumar (2008) show opposite results that IPO firms report conservatively to avoid higher monitoring and scrutiny by regulatory agencies or interested parties.[10] Korean studies also examine the event-driven incentives for accounting choices for IPO firms. Several studies find evidence of accruals earnings management prior to and in the IPO year (Lee et al. 2005), after the IPO year but not prior to the IPO year (Kim et al. 2004), and real-earnings management in the year before and in the IPO year (Choi et al. 2010). A recent study by Kim and Lee (2010), using a sample period 2000-2007, document that IPO firms engage in accruals earnings management up to the IPO year and that such firms show poor long-term stock return performance. However, these studies do not investigate the capital market consequences (i.e., underpricing) of having poor

[10] Studies that examine the impact of accounting information on valuing IPOs also find conflicting results. For example, Kim and Ritter (1999) find that the accounting-based multiples such as price-earnings, market-to-book, or price-to-sales of comparable firms, have limited predictive ability in forming the offer price. Purnanandam and Swaminathan (2001), using a measure of intrinsic value based on accounting measures, find that offer prices are priced substantially above the comparable firms. The problem with this line of literature is that it is difficult to develop accurate valuation measures for IPOs (Ritter and Welch 2002).

accruals quality using the more advanced measure of accruals quality, nor compare the effects before and after the implementation of regulatory policies.

Subsequent studies on the causes of IPO examine the impact of information asymmetry on underpricing in various settings using more direct proxies of the information quality such as country-level earnings quality measure (Boulton et al. 2011), the tone of Form S-1 which is the first SEC filing in the IPO process (Loughran and McDonald 2013), and the information content of IPO prospectuses (Hanley and Hoberg 2010). These studies document that good information quality, proxied by high quality earnings information, certainty of the text in filing form, and informativeness of IPO prospectuses, results in the reduction of IPO underpricing. As an extension of this line of literature, I rely on the accounting literature to obtain more precise measures of information quality and validate the role of accounting information (e.g., accruals quality) in determining underpricing.

To provide more support for my measure of information asymmetry, which is accruals quality, there is ample evidence in the accounting and finance literature that this AQ measure that captures the mapping between accruals and cash flows, explains a wide range of capital market outcomes. For example, in a study that investigates mergers and acquisitions, McNichols and Stubben (2012) document that when target firms have higher AQ, acquirer returns around the acquisition announcement are higher and target returns are lower, consistent with higher-quality accounting information reducing uncertainty in the target's value. Lee and Masulis (2009) find that poor accounting information quality, proxied by the AQ measure, is associated with more negative market reaction to equity offer announcements. Bhattacharya et al. (2013) report that firms with poor mapping of accruals into cash flows display reduced information content of reported earnings, and thus high information asymmetry, proxied by the price

impact of trade as well as the bid-ask spread.

Based on these findings, I predict that poor accruals quality increases the information asymmetry between managers and investors because investors are given less precise information about the IPO firm. On the initial offering day, as trading starts, the market discovers the intrinsic value of the firm in the trading process, which results in greater magnitude of IPO underpricing. However, it is a research question whether and how the regulatory policies and the subsequent deregulation efforts will differentially affect the relation between accounting quality and IPO underpricing. To disentangle the effect of these regulations on the Korean IPO market, I examine the impact of accruals quality on IPO underpricing separately for the regulation (September 2003 - May 2007), and deregulation periods (June 2007 - 2011).

To provide the basis for my predictions for the regulation and deregulation periods, I develop a simple model of the accruals quality effect on IPO pricing for the two periods. I consider a one-period model in a market which consists of two types of firms, one with good accruals quality (firm A) and one with poor accruals quality (firm B). The true offer price of firm A and B are denoted as P_A* and P_B*, respectively. The final offer price of firm A and B are P_A^o and P_B^o, respectively.

I use the capital structure framework of Ross (1977) to derive the offer price for firm A and B during the regulation period. I assume that institutional investors that participate in the book-building process cannot distinguish high-quality AQ firms from poor-quality AQ firms in accordance with Ross (1977)[11] while underwriters have superior information about the firm and thus can discriminate firm A from firm B. The objective of the underwriters is to

[11] A line of literature which studies the channel by which asymmetric information impacts underpricing start from the presumption that the issuer is better informed about the true state of the firm than the investor (Allen and Faulhaber 1989, Grinblatt and Hwang 1989, Welch 1989).

maximize underwriting fees for the IPO, facilitate the selling of shares, and absorb all shares in the market in a competitive environment.[12]

During the regulation period (September 2003 - May 2007), in practice, underwriters use Eq. (1) in determining the price of initial shares. The pre-fixed pricing scheme provides disincentives for the underwriters to incorporate the accounting information quality into the price. The regulatory policies, which severally decrease the underwriters' ability and incentives to take control of the IPO process, result in making the accounting quality information less relevant. Since the underwriters do not put forward efforts to distinguish between type A and type B firms, individual investors cannot discern type A firms, until trading occurs on the IPO date.

Under the capital structure framework of Ross (1977), in a world where investors cannot distinguish good firms from bad firms, the equilibrium is where the values of good firm and the value of bad firm are set to be the same. This is because it would be ineffective for good firms to inform the market that they are of good type rather than bad type, because bad firms would imitate the behavior of good firms. Thus, in the regulation period, uninformed investors act as if any firm has a q chance of being a firm with good AQ. The returns, a and b, depend on the information given at the time of IPO. Given the available information at time 0, firms have a q chance of being type A and a (1 - q) chance of being type B. Thus, all firms will have the same value as the following where r is the rate of return:

$$\mathrm{V}_0 = \frac{qa+(1-q)b}{1+r} \tag{2}$$

with

$$\mathrm{V}_{\mathrm{A}}{}^{\mathrm{o}} > V_{\mathrm{o}} > V_{\mathrm{B}}{}^{\mathrm{o}} \tag{3}$$

It would be ineffective for type A firms to attempt to inform or signal to

[12] In Korea, only the firm commitment method can be used by the underwriters.

the market of their type because B firms would also send the same false signal, thereby placing the equilibrium where (Ross 1977)

$$V_A{}^o = V_B{}^o \qquad (4)$$

Condition (4) sets the offer price for A ($P_A{}^o$) and B ($P_B{}^o$) to be the same, that is, $\frac{P_A*+P_B*}{2}$. One should note that the value of a put-back option, *O*, reflects the risk that the price of the IPO stock might fall below the offer price. In other words, an IPO firm with poor accrual quality (e.g., firm B) has a higher risk of its price falling below the 90% level, so the true value of the put-back option for firm B, O_B*, has a higher value compared to firm A. Therefore, the value of a put-back option serves as a proxy for the risk that the underwriters face (Joh and Lee 2007).

During the regulation period, underwriters have an incentive to lower the initial offer price of an IPO[13] to reduce the risk of the price falling below the 90% threshold to avoid exercise of the option and achieve their objective of selling all shares to the market. Since investors cannot distinguish between type A and type B and underwriters have no incentives to reflect the quality of accounting information into the offer price of the IPO firm, the value of the put-back options for firm A and firm B will accordingly be exactly the same. Subtracting the effect of the put-back option values, the final offer price for firm A and B during the regulation period becomes $\frac{P_A*+P_B*}{2} - \frac{O_A+O_B}{2}$.[14]

On the IPO date, the price discovery takes place as investors collect information about the IPOs and the information about the type of firms is revealed in the marketplace. Figure 1 illustrates this point in detail. P_A* and P_B*

[13] The report titled "Plans for globalizing the IPO market" issued on May 2007 by the FSS shows that the offer price of IPOs are, on average, set as approximately 72% of its true price.

[14] Here, 1) the true price of firm A is larger than the true price if firm B ($P_A * > P_B *$); 2) the value of the put-back option for firm A is smaller than that for firm B because firm B has more information risk $O_A * < O_B *$); 3) $\frac{P_A*+P_B*}{2} > P_B *$

are the true offer price of firm A (grid 0) and B (grid 4). Both types of firms would experience the same degree of underpricing (two grids) in a perfect market. In Figure 1A, in the regulation period, the initial offer price is set as the average of A and B, $\frac{P_{A}*+P_{B}*}{2}$ (grid 2), subtracted by the average of the values of the option, $\frac{O_{A}+O_{B}}{2}$. Thus, the offering at time 0 starts at grid 1 rather than at grid 2 due to the effect of the option, and at the end of the day, good accruals quality firm (type A) results in a much higher level of underpricing as compared to poor accruals quality firm (type B) due to the lower initial offer price for good AQ firms, induced by the implementation of the put-option and other restrictive measures. The following hypothesis summarizes the effect of the regulatory policies on the IPO market on the role that accruals quality plays in determining IPO underpricing.[15]

Hypothesis 1. Good accruals quality is associated with higher IPO underpricing in the regulation period.

[Insert Figure 1 in here]

In contrast, in the deregulation period (June 2007 - 2011), the abolishment of the put-back option and restrictions on the pricing and allotment of new shares free the underwriters from the responsibility to buy back shares from investors and encourage them to use their knowledge and discretion in determining the offer price. In setting the offer price, the underwriters incorporate the quality of accounting information into the offer price so that type A firms are priced at more favorable prices compared to type B firms. For type B firms, in order to ensure all shares of poor AQ firms are absorbed in the

[15] Figure 1B illustrates the relation between accruals quality and underpricing under a more relaxed assumption that underwriters have moderate knowledge about the accounting quality of IPO firms. Even under such circumstance, due the effect of the regulatory policies, the underpricing for good AQ firms is still larger than that of poor AQ firms.

market, the underwriters offer additional discount to bad firms. Thus, for firm A, the offer price is set to be P_A*, while for firm B, the offer price is (P_B* - α), in which α is the amount of discount reflecting the probability that the shares will not be fully absorbed on the day of IPO.[16] As shown in Figure 1C, due to the discount given to poor accruals quality firms, firm B experiences a higher level of underpricing relative to firms with good accruals quality.

In sum, during the deregulation period (June 2007 - 2011) in which the IPO market in Korea is much more closely resembling the global IPO market, I expect IPO firms with poor accruals quality to experience greater underpricing because of heightened information asymmetries between investors and underwriters, thus higher information risk, compared to IPO firms with high accruals quality. The discussion leads to the following testable hypothesis.

Hypothesis 2. Poor accruals quality is associated with higher IPO underpricing in the deregulation period.

III. Research Design

3.1 Measurement of Accruals Quality

To test my hypotheses, I draw upon the accounting literature to obtain more precise measures of information quality. The quality of a firm's accounting information is often estimated by a firm's accruals quality. Until recently, accruals quality was primarily measured in terms of discretionary accruals with the assumption that managers intentionally manipulate or manage accounting information. A variant of the Jones (1991) model, such as the modified Jones model (Dechow et al. 1995), or performance-matched discretionary accruals (Kothari et al. 2005) is employed to separate the portion of accruals most

[16] The objective of the underwriters is to sell all IPO shares in the market under a firm commitment contract and therefore the underwriters have an incentive to offer additional discount for firms with poor accruals quality to induce purchase from investors.

subject to managerial discretion.

More recently, some researchers in financial accounting question whether such methodology can reliably distinguish between earnings management in a changing operating or economic environment. Because both the intentional and unintentional effects can increase investor uncertainty, a measure that captures both of these effects is arguably preferable. The discretionary accruals approach is used based on the notion that managers exploit their discretion over accounting decisions to improve reported earnings. However, even in the absence of intentional earnings management, accounting information is affected by volatility in a firm's fundamentals such as its operating environment as well as its industry- and firm specific-characteristics. To the extent investors differ in the ability to process this information, poor accruals quality creates more uncertainty for outside investors about a firm's true performance, regardless of whether it is created through earnings management or not (Lee and Masulis 2009). Further, Bhattacharya et al. (2013) report that the extent to which a firm's earnings (accruals) map into cash flows directly influences the magnitude of information asymmetry and that poor earnings quality is significantly associated with higher information asymmetry.

Adopting more recent financial accounting literature, I use several approaches to measure the accruals quality of the IPO firms and these measures intend to capture the general quality of the issuer's accounting information rather than any discretionary reporting behavior that might occur shortly before going public. Following Dechow and Dichev (2002), my first measure of accruals quality is based on the standard errors of residuals from a model mapping yearly current accruals into operating cash flows in the prior, current, and subsequent years estimated in each of the past five years, where larger standard errors imply poorer quality accounting information. This model was

modified by McNichols (2002) to control for changes in sales revenue and property, plant, and equipment (PPE) and is called the modified DD model (hereafter MDD), which I use as my second proxy of accounting information quality. In the MDD model, changes in sales revenue and PPE are added to model (5) because these components are important in forming expectations about current accruals, beyond their direct effects on operating cash flows. Ball and Shivakumar (2006) further develop a model that incorporates the asymmetry in gain and loss recognition (timelier loss recognition), the notion of conservatism, which I use as my third measure of accruals quality (hereafter BS model). I use the composite index of the percentile rank values of the three measures as my primary measure of accruals quality (AQINDEX) in this study.

The quality of reported accruals, which I use to proxy for general accruals quality, is measured as the standard deviation of residuals from the following models:

$$TAC_{t-1} = b + b_1\, CFO_{t-2} + b_2\, CFO_{t-1} + b_3\, CFO_t + \varepsilon \qquad (5) \text{ - DD}$$

$$ACC_{t-1} = b + b_1\, \Delta REV_{t-1} + b_2\, GPPE_{t-1} + b_3\, CFO_{t-2} + b_4\, CFO_{t-1} + b_5\, CFO_t + \varepsilon \qquad (6) \text{ - MDD}$$

$$ACC_{t-1} = b + b_1\, \Delta REV_{t-1} + b_2\, GPPE_{t-1} + b_3\, CFO_{t-2} + b_4\, CFO_{t-1} + b_5\, CFO_t + b_6\, DCFO_{t-1} + b_7\, CFO_{t-1} * DCFO_{t-1} + \varepsilon \qquad (7) \text{ - BS}$$

where *TAC* is net income less cash flow from operations plus depreciation expenses[17], *ACC* is net income less cash flow, *CFO* is cash from operations, *REV* is sales revenue, and *GPPE* is gross property, plant, and equipment, each of which is deflated by average total assets. *DCFO* is an indicator variable that

[17] Consistent with Givoly and Hayn (2000), I use accruals before depreciation to capture working capital accruals such as changes in current assets and current liabilities in the DD model. However, I do not adjust for depreciation expenses in capturing total accruals in the MDD and BS models because gross property, plant, and equipment is included as the explanatory variable, thus incorporating working capital accruals arising from Capex.

equals 1 if *CFO* is negative, and 0 otherwise. CFO_t is the most recent fiscal year ending prior to the date the firm goes public.[18]

Each of the model is estimated separately for each industry group based on the two-digit Korean Standard Industrial Classification (KSIC) code having at least 10 firms in a given year. The industry-specific cross-sectional regressions in a given year generate firm-specific residual for that year. The standard deviation of the residuals is calculated over years *t*-4 through *t* in which I require a minimum of three years of data out of the five years. Each of the residuals calculated for models (5) through (7) are ranked between 0 and 1, and I compute the average of the three to obtain the composite index, AQINDEX, as my primary measure of accruals quality. Larger standard deviations of residuals reflect a greater portion of accruals left unexplained by the model, indicating poorer accruals quality.

While the DD, MDD, and BS models are a popular approach for estimating accruals quality in financial accounting studies, I recognize that they have some limitations. It contains measurement errors due to the omission of other firm-level characteristics that affect accruals; the estimation assumes that the firm level parameters remain constant over time (Dechow et al. 2010). I address this concern by using an accruals model that incorporates firm fixed effects and I further discuss this issue in the robustness test Section 6.

3.2 Models of Accruals Quality and IPO Underpricing

[18] I use accounting data for the fiscal period ending at least three months prior to the IPO offer date. In other words, I allow for 3-month lag after the fiscal year-end for the financial reports to be released and used by the underwriters. For example, for a December-year-end company that went public in January of 2005, the most recent financial statements available are those with fiscal year ending 2003. This requirement is to ensure that the time period that the accounting information is publicly available is properly matched with the time the IPO firm is evaluated. Additionally, I use *CFO* at time t, rather than *CFO* at time t+1 in models (5) through (7) to ensure that underwriters had access to all information required in estimating AQ at the time of IPO valuation. Changing the models to capture *CFO* at time t+1 does not alter the results.

I measure the initial returns of IPOs as the percent change from the offer price to the price at the close of the first day of trading. I examine the association between accruals quality and IPO underpricing during the regulation and deregulation periods. The regulation period runs from September 2003 to May 2007, as the put-back option and the restrictions on the underwriters' role were in effect during that period. Upon the abolishment of the regulatory policies in June of 2007, I define the deregulation period to range from June 2007 to 2011. In all regression models, I use ten different control variables taken from the prior IPO literature on the basis of their ability to explain first-day returns.

The IPO specific variables are: (1) Offer size - the natural log of the offer size. Larger offerings are subject to higher level of scrutiny by the market and exhibit less uncertainty than smaller offering (Jegadeesh et al 1993; Michaely and Shaw 1994); (2) Age - the natural log of the age of the firm, measured as the number of years from the date of establishment. The information set might be richer for older firms and Loughran and Ritter (2004) use age as a proxy for risk; (3) Leverge - ratio of total liabilities to total assets; (4) Top underwriter - Carter and Manaster (1990), Megginson and Weiss (1991), and Barry et al. (1990) all report a certification effect which leads to lower underpricing. The indicator variable set to one for IPOs underwritten by one of the top four investments banks which are Daewoo, Samsung, Kyobo, and HanKook; (5) Size - the natural log of total assets; (6) Return on assets - net income divided by average total assets; (7) Sales growth - percentage change of sales; (8) KOSDAQ - equals one if the firm is listed on KOSDAQ market, and 0 otherwise; (9) Hot market - more favorable investor sentiment about the IPO market will encourage more firms to go public because they can more easily place their shares. Loughran and Ritter (2002) find a significant autocorrelation

of initial returns. Similar to Bradley and Jordan (2002), I employ an average of the initial returns for IPOs in the previous 30 calendar days. (10) Return volatility - standard deviation of returns over the first 30 calendar days following the offering. I require that the accounting-based measures of information asymmetry are not simply capturing stock price uncertainty by also including stock return volatility as a competing explanatory variable in the analysis. A number of prior studies use similar variables to explain first-day returns (Bradley and Jordan 2002; Loughran and Ritter 2002). (11) Bid – subscription ratio capturing the demand for the particular IPO. (12) Big 4 – whether or not the IPO firm is audited by a Big 4 auditor or not. (13) DForeign – indicator variable set to one if the proportion of foreign shareholders is greater than the median value, and (14) AdjAcc – performance-adjusted abnormal accruals following Kothari et al (2005). See the Appendix for more detailed variable definitions. I also include year and industry fixed effects in all regression models.

I use the following model to estimate the effect of accruals quality on first-day returns using the IPO sample separately for the regulation and deregulation periods:

$$\begin{aligned}\text{Underpricing} = a &+ \alpha_0 \text{ AQINDEX} + \alpha_1 \text{ offer size} + \alpha_2 \text{ age} + \alpha_3 \text{ leverage} \\ &+ \alpha_4 \text{ top underwriter} + \alpha_5 \text{ size} + \alpha_6 \text{ return on assets} \\ &+ \alpha_7 \text{ sales growth} + \alpha_8 \text{ KOSDAQ} + \alpha_9 \text{ hot market} \\ &+ \alpha_{10} \text{ return volatility} + \alpha_{11} \text{ bid} + + \alpha_{12} \text{ Big4} + \alpha_{13} \text{ DForeign} \\ &+ \alpha_{14} \text{ AdjAcc} + \text{year and industry fixed effects} \\ &+ \varepsilon \qquad (8)\end{aligned}$$

where all variables are as previously defined.

IV. Sample Construction and Descriptive Statistics

I construct the sample by retrieving each IPO with a valid offer price and offer size from 2003 to 2011.[19] Table 1 shows that the initial exaction of all IPOs results in 537 IPOs. Next I match each IPO firm with the FnGuide database to collect the closing market price and with KIS-VALUE for financial data to calculate IPO initial returns and the control variables. This process leads to dropping 109 IPOs without necessary data. To estimate AQINDEX, I need at least three of the five years of financial accounting data prior to the IPO date. The data requirement results in a final sample of 222 IPOs for the full period (72 IPOs for the regulation period and 150 IPOs for the deregulation period).

[Insert Table 1 in here]

Table 2 reports descriptive statistics of the sample firms for the regulation (September 2003 - May 2007) and deregulation (June 2007 - 2011) periods[20]. Panel A shows that the general accruals quality is poorer in the regulation period compared to the deregulation period in the composite index as well as in all three individual AQ measures. Consistent with prior literature (Joh and Lee 2007; Kim and Sonu 2012), the mean underpricing during the put-back option is higher by 16.2% and the difference is statistically significant at the 5% level (*t-stat* = 0.018). The firm characteristics variables show that IPOs in the deregulation period tend to be larger in size, older, more leveraged, profitable, and tend to hire a more credible underwriter. On the other hand, the return volatility and the measure for hot market are larger in the period in the

[19] I thank Woori Investment & Securities Co. for providing data for the offer price of IPOs in Korea from 2004 to 2011 and also for the industry expertise.

[20] To remove the effect of the subprime mortgage crisis, I exclude IPO firms that went public in 2008 (2008 and 2009), which is the year (years) most affected by the global financial crisis. The sample size for the deregulation period reduces to 127 (100), but the coefficient on AQINDEX is 0.372 (0.428) and remains significant at the 5% (5%) level with *t-stat* of 2.26 (2.49). I also removing firms that issued financial statements in 2008 reduces the sample size to 117 for deregulation period, but the coefficient on AQINDEX still remain significant at the 5% level (*t-stat* = 2.51).

regulation period. The standard deviations of the control variables are generally similar between the regulation and deregulation periods while these values for AQINDEX and underpricing tend to be higher in the regulation period.

Panel B offers preliminary evidence that accruals quality influences underpricing in the predicted direction. Panel B groups the IPO firms into accruals quality quartiles based on their average annual AQINDEX for the sample period. IPOs with the highest accruals quality are in the lowest AQ quartile and those with the lowest accruals quartile are in the highest AQ quartile. In the regulation period, the average underpricing increases with accruals quality, a prediction consistent with my model. In the deregulation period, the average underpricing increases as the accruals quality deteriorates consistent with the role of asymmetric information magnifying underpricing. Across AQ quartiles, the average underpricing is almost 50.8 percent (or 12.7 percentage points) higher in the lowest accruals quartile compared to the highest quartile. Since there exist many differences in the IPO process in the types of firms going public, I test for the link between accruals quality and IPO underpricing while holding constant firm-level characteristics in the next section.

[Insert Table 2 in here]

V. Empirical Results

This section discusses the empirical results. I base inferences from all regressions on standard errors corrected for clustering the firm level. All regressions in this paper include industry indicator variables using a one-digit KSIC code and listing year indicator variables to control for year and industry fixed effects. Furthermore, to alleviate the effect of outliers, I winsorize the top and bottom 1% of all of the continuous variables in each year.

Table 3 reports results on the relation between accruals quality and underpricing after controlling for firm characteristics known to be associated with underpricing for the full, regulation, and deregulation periods. Model 1 and 2 report regression results for the regulation and deregulation periods, respectively. The results suggest that the role of accruals quality in determining the initial returns is insignificant during the regulation period (*t-stat* = -0.81), although directionally consistent. It is likely that the small sample size for the regulation period (n = 72) and the resultant lack of statistical power lead to the insignificant results.[21]

Model 2 reports the regression results for the deregulation period (June 2007 - 2011). The coefficient on AQINDEX is positive (0.341) and statistically significant at the 5% level (*t-stat* = 2.44), consistent with the hypothesis that poor accruals quality is associated with higher IPO underpricing in a deregulated IPO market. In contrast to the regulation period, the AQINDEX is an economically significant factor. A one-standard deviation decrease in the AQINDEX (i.e., improvement in the aggregate accruals quality measure) is linked with economically significant 8.5% reduction in average underpricing (0.341 coefficient value multiplied by standard deviation of 0.248). Also, the difference in the coefficient on AQINDEX between the regulation and deregulation periods is significant at the 5% level (*t-stat* = 2.07). In summary, the evidence indicates that firms going public with low accruals quality experience higher average underpricing in the deregulation period, consistent

[21] The negative sign on AQINDEX implies that the regulatory policies on the IPO market result in IPOs with good AQ experiencing higher initial returns, consistent with the prediction offered in Section 2. Multiplying the regression coefficient by the standard deviation of AQINDEX (0.250 times -0.182) suggests that enhanced accruals quality by one-standard deviation leads to an increase in first-day returns of 4.5% in the regulation period, although the effect is not statistically significant.

with the information asymmetry hypothesis.[22]

[Insert Table 3 in here]

To further examine the association between the composite index of accruals quality and underpricing, in Table 4, I extend the sample period to include the market stabilization period ranging from 2001 to 8/2003. The market stabilization period is marked by the stronger regulatory policies that were in place, limiting the discretion of underwriters in setting the offer price and in distributing shares. For example, underwriters were forced to use a pre-determined methodology to compute the offer price (more stringent policies than the disclosure requirement in the regulation period). Thus, I expect that the prediction for the regulation period can be applied to the market stabilization period and that the relation will be stronger due to the more stringent market stabilization polices.

Table 4, Panel A, shows the results for the relation between AQINDEX and Underpricing for three different periods: market stabilization (1/2001-8/2003),

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[22] I perform additional test to confirm that the measure of accruals quality influences split bond ratings over and beyond the effects of discretionary accruals (Kothari et al. 2005). I estimate four measures of discretionary accruals and include it as additional control variable in Eq. (8). I find that the results remain significant at the 5% level after controlling each of the four measures, two measures of signed and two measures of unsigned discretionary accruals as described below.

I use the absolute value of two performance-adjusted measures suggested by Kothari et al. (2005). I use the following steps to obtain the signed discretionary accruals measures:

The first signed discretionary accruals measure is estimated as the residuals of Kothari et al. (2005) model for each year and industry with 10 or more firms;

$$TAC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t) + \beta_3 GPPE_t + \varepsilon,$$

in which *Asset* is defined as average total asset and other variables are as defined in the Appendix.

The second signed discretionary accruals measure is the performance-matched discretionary accruals measure, obtained by taking the difference between the residual for each firm and the median unadjusted abnormal accruals for the *ROA* decile of the industry and year to which the firm belongs.

For the two unsigned measure, I obtain the absolute values of the two discretionary accruals as described above.

regulation (9/2003-5/2007), and deregulation periods (6/2007-12/2011). I find that the results are only significant in the deregulation period at the 5% level, consistent with H1. Examining the results for market stabilization and regulation period, the coefficients on AQINDEX are -0.182 (*t-stat* = -0.81) and -0.542 (*t-stat* = -0.158), respectively. Although the coefficients are not statistically significant, the magnitude of the positive impact of accruals quality on underpricing increases in the market stabilization period. This can be partially explained by the more stringent governmental regulations that were in place in the market stabilization period compared to the regulation period.

Table 4, Panel B, shows the results for the relation between AQINDEX and Underpricing for two different periods: total regulation period (1/2001-5/2007), and deregulation periods (6/2007-12/2011). When the market stabilization and regulation periods are combined, I find that the coefficient on AQINDEX becomes statistically significant and negative (-0.344) at the 5% level (*t-stat* = -2.05). Also, the difference in the coefficient on AQINDEX between the total regulation and deregulation periods is significant at the 1% level (*t-stat* = 3.19). In summary, the evidence indicates that firms going public with low accruals quality experience higher average underpricing in the deregulation period, whereas I find the opposite evidence in the regulation period, consistent with H1 and H2.

[Insert Table 4 in here]

VI. Robustness Tests

This section provides various types of robustness analyses. Specifically, this section takes into account the non-linear characteristics of accruals quality and addresses concerns on potential correlated omitted variables problems using a 2SLS approach and selection problems using Heckman procedure.

Additionally, I control for the effect of governance structure of firms going public by controlling for ownership variables. Finally, I use alternative measures of accruals quality which incorporates firm fixed effects to address limitations of the accruals quality index, conventional discretional accruals measures, and future operating cash flows.

6.1 Non-linear specification of accruals quality

To allow for a non-linear relation between accruals quality and first-day initial returns, I replace the composite accruals quality index measure with the accruals quality quartile indicator variables (i.e., AQ1 to AQ4), where a larger value indicates poorer accruals quality.[23]

Table 5 reports the results of the regression of underpricing on accruals quality quartile indicator variables and other determinants of underpricing for regulation and deregulation periods. In this specification, the model intercept captures the underpricing impact estimated for the benchmark portfolio with the highest accruals quality (quartile 1). The coefficients on each of the quartile indicator variables (i.e., AQ2 to AQ4) represent the differences between each quartile's underpricing effect and that of the benchmark portfolio, AQ1. Focusing on model 2, I find that, relative to Quartile 1, each of the quartile indicator variables (i.e., AQ2 to AQ4) shows a positive and significant coefficient, consistent with poor accruals quality leading to higher underpricing in the deregulation period. Specifically, moving from AQ2 to AQ4, the coefficients exhibit a monotonic decrease in the level of underpricing (e.g.,

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[23] The statistical model is as follows:

$$\begin{aligned}\text{Underpricing} = \alpha &+ \alpha_0\,\text{AQ2} + \alpha_1\,\text{AQ2} + \alpha_2\,\text{AQ3} + \alpha_3\,\text{offer size} + \alpha_4\,\text{age} + \alpha_5\,\text{leverage}\\ &+ \alpha_6\,\text{top underwriter} + \alpha_7\,\text{size} + \alpha_8\,\text{return on assets} + \alpha_9\,\text{sales growth}\\ &+ \alpha_{10}\,\text{KOSPI} + \alpha_{11}\,\text{hot market} + \alpha_{12}\,\text{return volatility} + \alpha_{13}\,\text{Bid} + \alpha_{14}\,\text{Big 4}\\ &+ \alpha_{15}\,\text{DForeign} + \alpha_{16}\,\text{AdjAcc} + \text{year and industry fixed effects} + \varepsilon\end{aligned}$$

where AQ2 – AQ4 are the quarile indicator variables for AQINDEX and the other control variables are as defined previously.

from -0.058 to 0.217), which suggests that, in the absence of regulatory policies on the IPO market, as accruals quality improves, the magnitude of underpricing decreases due to reduced information asymmetry.

For model 2, I find that the relation between accruals quality and IPO underpricing in the regulation period is opposite to that during the deregulation period. For example, relative to Quartile 1, each of the quartile indicator variables (i.e., AQ2 to AQ4) shows a negative (but insignificant) coefficient. Although the coefficients are insignificant, the results in model 2 show a general trend that as accruals quality decreases, the magnitude of underpricing also decreases (e.g., the coefficients on AQ2 and AQ4 are -0.116 and -0.132, respectively) in the regulation period. The evidence in this table supports the hypothesis that poor accruals quality is associated with larger underpricing during the deregulation period in a non-linear specification as well.

[Insert Table 5 in here]

6.2 Controlling for potential endogeneity in the determination of accruals quality

Accruals quality can be an endogenous variable in the sense that certain firm characteristics that affect accruals quality might also affect the consequences of poor quality (Cohen 2008) such as underpricing. For example, firm size may affect both accruals quality and the level of underpricing and thus bias the regression estimates in the absence of proper controls. To ensure that the results are not affected by potential correlated omitted variables, I employ the two-stage instrumental variable (2SLS) approach to correct for such endogeneity between accruals quality and underpricing.

Closely following the approach outlined in Cohen (2008), I employ the following instrumental variables: *Asset Growth* (current year's growth in asset), *Net PPE* (net plant, property, and equipment), *Herf* (the Herfindahl-Herschman

Index), and *DPubDebt* (indicator variable for public debt issuance).

In the first-stage regression, the dependent variable is accruals quality and the independent variables include the instrumental variables and control variables in the original OLS model discussed in Section 3.2.[24] In the second stage, underpricing is regressed on the predicted accruals quality (AQINDEX IV) from the first-stage regression results and other known determinants of underpricing. The AQINDEX IV serves as an instrument for the component of accruals quality that is unrelated to firm characteristics that influence underpricing.

Although not tabulated, the empirical results for the first-stage regression of 2SLS procedures, during the deregulation period, show that *Net PPE* and *DPubDebt* are significant at the 5% level and Shea's partial R^2 of the instrumental variables is 10.48%, providing some support for the use of the instruments.[25] It also passes Anderson canonical correlations test by rejecting the null hypothesis that the equation is under-identified (*p-value* = 0034). The over-identifying restriction test statistics which verifies the validity of the instruments does not reject the null hypothesis of exogeneity of all instruments (*p-value* = 0.2531). Thus, the evaluation suggests that the selection of the instrumental variables is appropriate.

Table 6 reports regression coefficients from the second-stage analysis for regulation and deregulation periods. In model 1, the coefficient on AQINDEX IV is negative (-0.344) and significant at the 10% level (*t-stat* = -1.71), which

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[24] Specifically, the first-stage regression model in 2SLS analysis is as follows:

AQINDEX = a + α_0 offer size + α_1 age + α_2 leverage + α_3 top underwriter + α_4 size + α_5 return on assets + α_6 sales growth + α_7 KOSPI + α_8 hot market + α_9 return volatility + α_{10} Bid + α_{11} Big4 + α_{12} DForeign + α_{13} AdjAcc + α_{14} Asset Growth + α_{15} Net PPE + α_{16} Herf + α_{17} DPubDebt + year and industry fixed effects + ε, where asset growth, Net PPE, Herfindahl-Herschman Index, and public debt are the instrumental variables in the first stage.

[25] I omit discussion on the first-stage regression results for the regulation period for simplicity.

suggests that firms with good accruals quality experience larger amount of underpricing in the regulation period, consistent with my prediction. In model 2, I find that the coefficient on AQINDEX IV is 0.879 and significant at the 5% level, consistent with accruals quality having a substantial impact on the level of underpricing in a deregulated IPO market.

I next compare the OLS results in Table 3 with the 2SLS results in Table 6. The comparison shows that the coefficients in 2SLS and OLS have the same sign and similar magnitudes and significance levels. Hausman tests reveal that the 2SLS results are not significantly different from the OLS results. I also perform a variant of the Hausman (1978, 1983) tests to determine if the variable, AQINDEX, exhibits evidence of endogeneity after controlling for a multitude of variables. The test is unable to reject the null hypothesis that AQINDEX is exogeneous.

[Insert Table 6 in here]

In addition, I assess how severe the endogeneity problem must be to overturn the OLS results using the Impact Threshold for a Compounding Variable (hereafter ITCV).[26] The ITCV for AQINDEX is 0.0441 which implies that the correlations between AQINDEX and Underpricing with the unobserved confounding variable each need to be around 0.2100 ($=0.0441^{0.5}$) to turn the OLS results in the deregulation period. To put this number in perspective, I calculate Impact for each of the control variables where Impact is defined as the product of the partial correlation between the independent variable and the control variable and the correlation between the dependent variable and the

[26] This method is based on the notion that stronger correlations between the omitted variable's correlation with the independent variable of interest and its correlation with the dependent variable, lead to more biased coefficient estimate. Specifically, ITCV is the lowest product of the two correlations (the partial correlation between the dependent variable and the confounding variable, and the partial correlation between the independent variable and the confounding variable) that could make the coefficient statistically insignificant (Frank 2000).

control variable (partialling out the effect of other control variables). There is only one control variable, Bid (ITCV=0.0517), that has an Impact with a larger magnitude than the relevant ITCV. It suggests that any unobserved confounding variable must be more highly correlated with the dependent variable and underpricing than any of the remaining control variables to overturn the OLS results. It is unlikely that such a variable will be found given that I already have a strong set of control variables in the model. Overall, the inverse relation between accruals quality and underpricing in the deregulation period can be observed after controlling for endogeneity using a 2SLS approach.

6.3 Controlling for potential selection problems

Given that the estimation process for accruals quality require first-time issuers to have survived at least three of the five years before their IPOs, the results on underpricing could be driven by this nonrandom selection criterion. The non-selected IPO sample consists of 543 IPOs during the period from September 2003 to 2011, which is reduced to 222 observations after imposing data restrictions on accruals quality measure, underpricing, and control variables. Therefore, it is possible that younger firms are systematically excluded. To avoid potential survivorship bias, I employ the Heckman (1979) selection model to test and correct for any significant selection bias.

Table 7 presents estimates from a Heckman selection model to examine the effect of accruals quality on underpricing. Lennox et al. (2012) suggest that an absence of "exclusion requirements" in the first stage can lead to severe multicollinearity[27] in the second stage and that the z variable must be an important determinant of the choice variable (e.g., survivorship) in the first

[27] I check for multicollinearity and find that the highest VIF score is 6.02 (for the inverse Mill's ratio) and 4.90 (for *Age*) for the deregulation period. The highest VIF score is 5.69 (for the inverse Mill's ratio) and 4.50 (for *Offer Size*) for regulation period. All of the VIF scores are less than the cutoff point of 10.

stage.[28] To meet this exclusion requirement, I include sunk costs of the industry in the first stage as firm survival is positively associated with sunk costs in that these constitute a barrier to exist (Audretsch 1995). To proxy for exogenous sunk costs, I use the variable *Barrier to exit*, measured by the median tangible fixed assets of the industry in the listed year.

Table 7, Panel A exhibits the results of the first-stage regression in which I include *Barrier to exit* in addition to all the control variables in the second stage. Examining the deregulation period, I find *Barrier to exit* to be positively and significantly associated with survivorship of a firm, consistent with prior literature. Table 7, Panel B reports the results of the second-stage regressions[29], the average coefficients and their corresponding *z*-statistics with the inverse Mill's ratio included. The insignificant coefficient on the inverse Mill's ratio across both periods indicate that self-selection does not significantly affect underpricing after controlling for accruals quality and other determinants of underpricing. I find that poorer accruals quality is associated with higher underpricing in the deregulation period, consistent with my hypothesis, and this

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[28] The first-stage regression model in the Heckman selection model is as follows:

SURVIVAL= a + α_0 offer size + α_1 age + α_2 leverage + α_3 top underwriter + α_4 size
+ α_5 return on assets + α_6 sales growth + α_7 KOSPI + α_8 hot market
+ α_9 return volatility + α_{10} bid + α_{11} Big4 + α_{12} DForeign + α_{13} AdjAcc
+ α_{14} Barrier to exit + year and industry fixed effects + ε,

where SURVIVAL is an indicator variable for when the observation fulfills the requirement for estimation of accruals quality; Barrier to exit is measured by the median tangible fixed assets, scaled by average total assets, of the industry, which serves as an instrument variable in the first stage; the definition of the remaining variables is provided in the Appendix.

[29] The second-stage regression model in the Heckman selection model is as follows:

Underpricing = a + α_0 AQINDEX + α_1 offer size + α_2 age + α_3 leverage + α_4 top underwriter
+ α_5 size + α_6 return on assets + α_7 sales growth + α_8 KOSPI + α_9 hot market
+ α_{10} return volatility + α_{10} bid + α_{11} Big4 + α_{12} DForeign + α_{13} AdjAcc
+ α_{14} Inverse Mill's ratio + year and industry fixed effects + ε,

where Inverse Mill's ratio is estimated from the first-stage regression model and all other variables are defined in the Appendix. In the second-stage regression, I adjust for heteroskedasticity and report standard errors that are clustered at the firm-level.

result is robust to adjusting for sample selection bias.

[Insert Table 7 in here]

6.4 The effect of ownership structure on the relation between AQINDEX and underpricing

Several conflicting theories have been proposed on why the pricing of IPO could be related to the eventual ownership of the firm. Brennan and Franks (1997) argue that management has the incentives to underprice new shares to create excess demand and allocate them to many small investors with the objective to increase the cost for the blockholders to accumulate large stakes and thus reduce blockcholders' monitoring. In contrast, Stoughton and Zechner (1998), based on their analytical work, argue that managers desire to increase monitoring by large blockholders to signal to the market that managers are maximizing the firm value. To induce such large blockholders to bear the cost of monitoring, shares are underpriced at the time of IPO.

Following this line of literature, I include additional control variables to address concerns that underpricing is affected by the ownership structure of the firm. Specifically, I obtain the variable for ownership by large shareholders and related parties (*Largest Shareholder*) for the year after the IPO year[30] for each firm. To account for the potential non-linear relation between underpricing and ownership structure, I also include the square of *Largest Shareholder* in the regression model. Table 8 presents the estimation results after controlling for the effect of ownership structure. Model 1 and 2 show that the coefficient on AQINDEX remains positive and statistically significant at the 5% level even

[30] Employing the ownership variable one year after the IPO year is appropriate 1) because the relevant theories refer to the relation between pricing of IPOs and the "subsequent" monitoring activities of blockholders, and 2) because requiring each firm to have ownership data in the IPO year substantially reduces the sample from 211 to 93 observations (29 observations in the regulation period and 64 observations in the deregulation period).

after controlling for both *Largest shareholder* and *(Largest shareholder)*^{2}. In summary, accruals quality continues to be significantly related to underpricing in the absence of the regulatory policies.

[Insert Table 8 in here]

6.5 Alternative accounting information quality proxies

I consider alternative accruals quality measures to buttress my findings, all of which indicate that the results are robust. Although the DD model is widely used to estimate accruals quality in accounting studies, the model is subject to several limitations. First, the DD model incorrectly classifies two types of firms as having good accruals quality: a firm with poor mapping of accruals and operating cash flows that produce consistently large residuals of the same sign, and a second firm with a relatively good mapping of accruals and operating cash flows that exhibit consistent low residual. As the DD model is based on the standard deviation of residuals across time, it has little ability to distinguish these two firms when the second type of firm apparently has higher accruals quality. Another problem with the DD model is that it does not capture other firm characteristics that are not in the model but significantly affect accruals quality (Lee and Masulis 2009).

To address the above caveats of the DD model, I augment the DD model with firm fixed effects to obtain additional measure of accruals quality (hereafter FDD). The FDD model is equivalent to the DD model, except that firm fixed effects and year effects are added and estimated in a single panel regression framework. The advantages of the FDD model are such that the firm fixed effects can capture time-invariant firm characteristics, allowing it to distinguish between firms that have consistently large accruals model residuals of the same sign, from firms that have consistently low residuals. Also, inclusion of firm fixed effects can mitigate correlated omitted variable problems

by capturing unobservable firm characteristics.

The results of the regression of underpricing on the residuals from the FDD model are reported in Table 10, Panel A. Larger values of FDD indicate poorer accruals quality. In model 1, which uses the firm fixed effect model as the proxy for accruals quality, the coefficient on FDD is positive and significant only in the deregulation period at the 5% level (*t-stat* = 2.35). Similarly, in model 2, which uses the new composite index that incorporates FDD, the coefficient on AQINDEX_FDD is positive and significant at the 1% level (*t-stat* = 2.71). in the deregulation period.[31] Consistent with the argument that increased asymmetric information exacerbates underpricing, I find that the initial first-day returns rise as measures of accruals quality decline in the absence of regulations on the IPO market. These alternative accruals quality measures generally exhibit smaller coefficient estimates for underpricing compared with AQINDEX measure. Nevertheless, poor accruals quality continues to have a significantly positive association with underpricing in a period with no regulatory policies.

[Insert Table 9 in here]

Next, I replace AQINDEX with conventional measures of discretionary accruals. I estimate abnormal accruals using the Jones (1991) model, *DiscAcc*, and performance-adjusted discretionary accruals, *AdjDiscAcc*, following Kothari et al. (2005). Table 10, Panel B shows that the number of observations increases to 195 and 264 for regulation and deregulation periods, respectively, because the discretionary accruals models require less historical data. Reestimating the effect of accounting information quality on underpricing, I find that the coefficient on *DiscAcc* is 0.535 and is significant at the 1% level,

[31] AQINDEX_FDD captures the average of the four accruals quality models, which are the DD, MDD, BS, and FDD models.

(*t-stat* = 2.84), suggesting that firms with high discretionary accruals experience greater magnitude of underpricing in the deregulation period. The coefficient on *AdjDiscAcc* is 0.404 and significant at the 5% level (*t-stat* = 2.27) only in the deregulation period, reinforcing my results.

Third, AQINDEX_FUTURE is defined as the standard deviation of the residuals from the DD, MDD, and BS models estimated using cash flow from operations in year *t*+1. This model is equivalent to the AQINDEX model except CFO_{t-2} is replaced with CFO_{t+1} to incorporate effects from future operating cash flows. Table 10, Panel C reports the results after replacing AQINDEX with AQINDEX_FUTURE. The results are stronger in the deregulation period in that the coefficient on AQINDEX_FUTURE is positive (0.302) and significant at the 1% level (*t-stat* = 2.72), consistent with my earlier findings.

Finally, although untabulated, I also conduct additional analyses to address the concern that the overlapping period between regulation and deregulation periods might affect the results given that AQINDEX is a measure that captures accruals surprises over the past five years. The years most affected by this concern are 2007 and 2008. I reestimate AQINDEX by using standard deviation of the residuals from the DD, MDD, and BS models estimated from the current year and two prior years only. The standard deviation is calculated from three residuals, v_t, v_{t-1}, and v_{t-2}, not five. I then remove all IPO firms listed in year 2007 and 2008 during the deregulation period to eliminate overlapping accounting periods over the two periods. The results show that the negative relation between accruals quality and underpricing remain intact. The coefficient on the new AQINDEX measure is 0.323 and positively significant at the 5% level (*t-stat* = 2.36) in the deregulation period. In summary, I conclude that declining accruals quality is associated with larger underpricing during the deregulation period and that this result is not driven by incorrect accruals

quality model.

VII. Conclusion

The research question that this study investigates is whether increases in information asymmetry between first-time issuers and outside investors are associated larger underpricing, and whether the relation is affected by regulatory policies on the IPO market such as the implementation of the put-back option or restrictions on the pricing of new issues. While several prior studies document a positive link between ex ante uncertainty about the IPO and its expected initial return (Beatty and Ritter 1986), there is no generally agreed-upon measures of asymmetric information. I use a more precise measure of information asymmetry based on accounting information that captures not only the discretionary reporting choices made by the managers but also any estimation errors caused by a firm's fundamentals, such as its operating environment and industry conditions. Further, I take advantage of the institutional setting in Korea which allows for me to test the effect of policy changes on the asymmetric information hypothesis.

Over the deregulation period ranging from June 2007 - 2011, I find that more asymmetric information about an IPO's values, as proxied by poorer accruals quality, produces higher first-day returns in a deregulated IPO market. Further, only the discretionary components of accruals quality are significantly associated with underpricing. In contrast, during the regulation period from September 2003 - May 2007, accruals quality does not play a dominant role in the pricing of IPOs. Further, during the total regulation period ranging from January 2001 to May 2007, I find that good accruals quality is associated with greater magnitude of underpricing, consistent with my prediction. The opposite relation is observed partially due to market distortions created by the regulatory

policies on the IPO market. These results are robust to controlling for potential endogeneity between accruals quality and underpricing, selection problems, non-linear specification, and alternative measure of accruals quality. In summary, the results reported in this paper present persuasive evidence that poor accruals quality is a determinant of IPO underpricing in the absence of regulatory policies.

I acknowledge that the findings are subject to some limitations. Although I find consistent results with existing theory, it is possible that the generalizability of the findings to other countries' settings could be an issue as a result of unknown institutional differences. Subject to this caveat, the results inform standard-setters, regulators, academicians, and managers about the impact of accruals quality on IPO underpricing and how the relation is influenced by the adoption of the put-back option and other regulations. In the future, regulators should understand the consequences of imposing regulatory measures which severally shrink the role of underwriters and impede informed trading that capitalizes on firm-specific information. Overall, this study sheds light on the regulatory implications on the role of accounting quality in the IPO process.

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APPENDIX

Variable Definitions

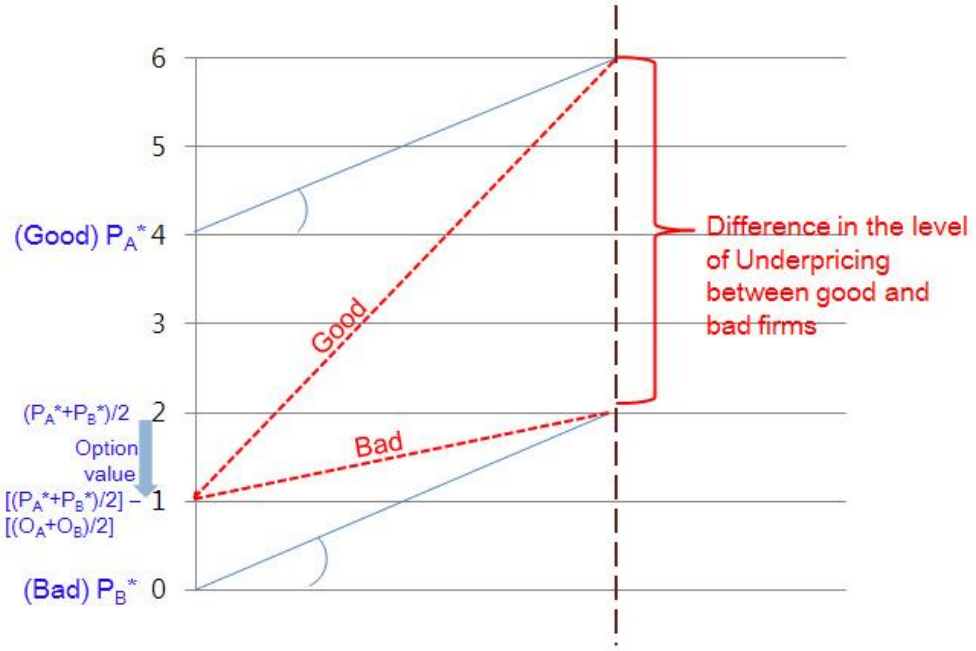
Variables	Definition
Variables used for estimating accruals quality	
ACC	Net income less operating cash flows, deflated by average total assets
TAC	Net income less operating cash flows plus depreciation expenses, deflated by average total assets
CFO	Operating cash flows from the cash flow statement, deflated by average total assets
DCFO	Equal to 1 if *CFO* is negative, and 0 otherwise
ΔREV	Change in sales deflated by average total assets
GPPE	Gross property, plant, and equipment, deflated by average total assets
Accruals quality measures	
DD	The standard deviation of Eq. (5) residuals over years t-4 through t in which I require a minimum of three years of data out of the five years $TAC_{t-1} = \beta_0 + \beta_1 CFO_{t-2} + \beta_2 CFO_{t-1} + \beta_3 CFO_t + \varepsilon$, where all variables are as defined above. First, I estimate the above equation annually for each two-digit KSIC industry having at least 10 firms with data available for at least three years of the five years *t*-4 through *t*. Then I calculate the standard deviation of the residuals across the five years.
MDD	MDD model is equivalent to the DD model except that *ACC* is used as the dependent variable and ΔREV and *GPPE* are added. In other words, $ACC_{t-1} = \beta_0 + \beta_1 CFO_{t-2} + \beta_2 CFO_{t-1} + \beta_3 CFO_t + \beta_4 \Delta REV_{t-1} + \beta_5 GPPE_{t-1} + \varepsilon$, where all variables are as defined above
BS	BS model is equivalent to the MDD model except that $DCFO_{t-1}$ and the interaction term between $DCFOt_{-1}$ and CFO_{t-1} are included. In other words, $ACC_{t-1} = \beta_0 + \beta_1 CFO_{t-2} + \beta_2 CFO_{t-1} + \beta_3 CFO_t + \beta_4 \Delta REV_{t-1} + \beta_5 GPPE_{t-1} + \beta_6 DCFO_{t-1} + \beta_7 DCFO_{t-1} * CFO_{t-1} + \varepsilon$, where all variables are as defined above
AQINDEX	Average of the percentile rank values of residuals estimated from the three accruals quality models, which are DD, MDD, and BS models
AQ1(2,3,4)	Indicator variable is one for issuers in the Quartile 1 (2, 3, 4) of accruals quality index and zero otherwise. Quartile

	1(4) is the group with best (worst) quartile of accruals quality
FDD	Firm fixed model is equivalent to the MDD model except firm fixed effects and year effects are added and estimated in a panel regression framework
AQINDEX_FDD	Average of the percentile rank values of residuals estimated from the four accruals quality models, which are DD, MDD, BS, and FDD
DiscAcc	Residuals from estimating discretionary accruals model by Jones (1991) for each year and industry: $ACC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 \Delta REV_t + \beta_3 GPPE_t + \varepsilon$, where all variables are as defined above
AdjDiscAcc	Performance-adjusted discretionary accruals using the methodology by Kothari et al. (2005): *DiscAcc* is adjusted by subtracting the median *DiscAdj* for firm i's industry-ROA decile
AQINDEX_FUTURE	This model is equivalent to the AQINDEX model except CFO_{t-2} is replaced with CFO_{t+1} to incorporate effects from future operating cash flows
Dependent variables	
Underpricing	First-day market closing price divided by the final offer price, minus 1
Survival	Equals 1 if the financial data necessary for estimating *AQINDEX* is available for at least three years of the five-year estimation period, and 0 otherwise
Other control variables	
Offer size	The natural log of the IPO offer size, measured as offer price multiplied by the number of IPO shares
Age	The natural log of the age of the firm, measured as the number of years from the date of establishment
Leverage	Ratio of total liabilities to total assets
Top Underwriter	Indicator variable set to one for IPOs underwritten by one of the top three investments banks in Korea that underwrite the highest number of IPOs on an annual basis, and zero otherwise
Size	The natural log of total assets
Return on assets	Net income divided by average total assets
Sales growth	$(Sales_t - sales_{t-1}) / sales_{t-1}$
KOSDAQ	Equals one if the firm is listed on KOSDAQ market, and 0 otherwise
Hot market	An average of the initial returns for IPOs in the previous quarter before IPO date, similar to Bradley and Jordan (2002)

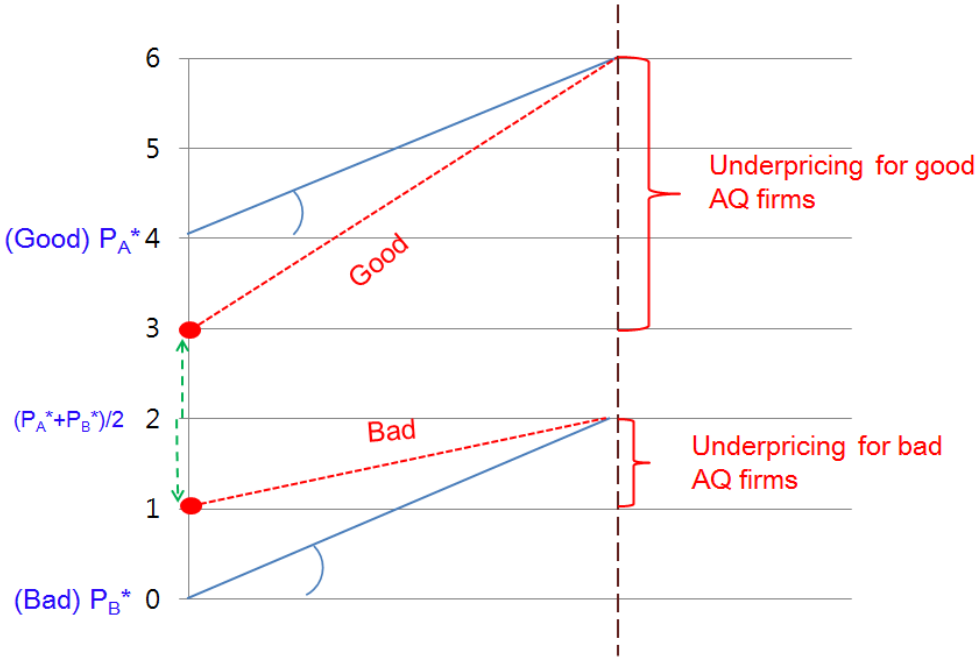
Return volatility	Standard deviation of returns over the first 60 calendar days following the offering
Bid	The natural log of subscription ratios
Big4	Indicator variable set to one if the auditor is one of the Big 4 firms, and zero otherwise
DForeign	Indicator variable set to one if the proportion of foreign shareholders is greater than the median value, and 0 otherwise
AdjAcc	Performance-adjusted abnormal accruals using the methodology by Kothari et al. (2005): I first estimate residuals from $ACC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t - \Delta AR_t) + \beta_3 GPPE_t + \varepsilon$, where ΔAR_t is change in accounts receivable and all other variables are as defined above. Next, the residual is adjusted by subtracting the median residual for firm i's industry-ROA decile.
Asset Growth	$(\text{Asset}_t - \text{asset}_{t-1}) / \text{asset}_{t-1}$
Net PPE	Net plant, property, and equipment deflated by average total assets
Herf	The Herfindahl-Herschman Index is calculated as the sum of squares of market shares in the industry. Herf = $\sum_{i=1}^{n}[\text{si}/S]^2$, where s_i is the firm's sales and S is the sum of sales for all firms in the industry (defined by the two-digit KSIC code)
DPubDebt	Indicator variable set to one when a firm has a positive end-of-year balance of bonds payable, and zero otherwise
Largest shareholder	Ownership of largest shareholders and related parties
(*Largest Shareholder*)^	The square of *Largest Shareholder*
Barrier to exit	The median tangible fixed assets, scaled by average total assets, of the industry

FIGURE 1

A. The price recovery process during the regulation period



B. The price recovery process during the regulation period with relaxed assumption on underwriter's knowledge about a firm's accruals quality



C. The price recovery process during the deregulation period

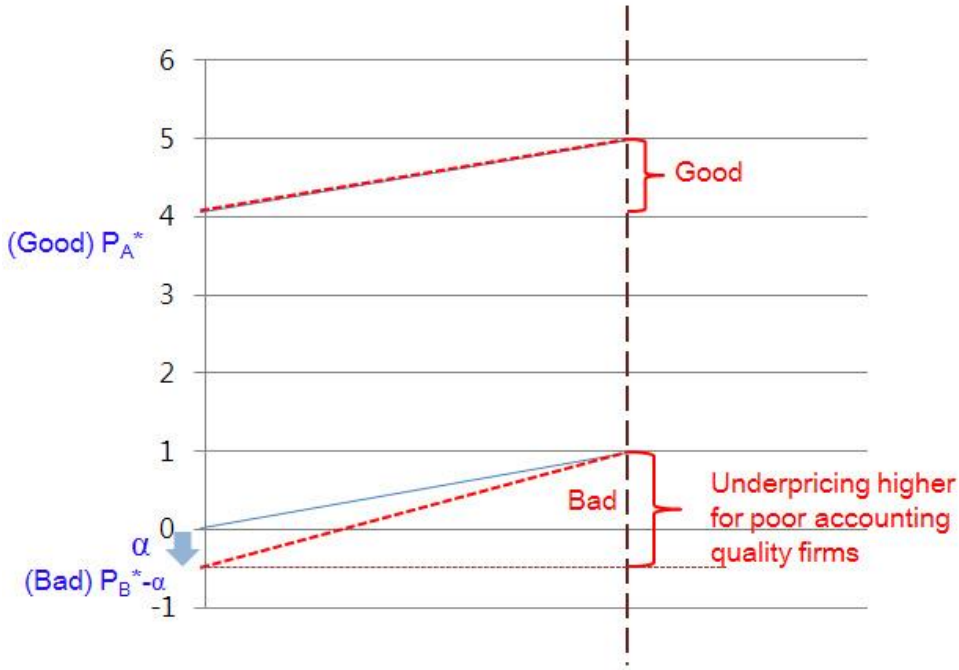


TABLE 1

Sample Description

IPO Sample Selection Procedure	**Number of IPOs dropped**	**Remaining IPOs**
(1) Pull all IPOs in Korea for the period 9/2003-12/2011 and exclude IPOs of special purpose acquisition company (SPAC).		537
(2) Drop IPOs that do not have a valid closing price and for which control variables cannot be calculated.	109	428
(3) Drop IPOs for which accruals quality measures cannot be obtained.	206	**222**

This table presents the sample construction process for the sample of 222 IPOs listed during the period 9/2003-2011.

TABLE 2

Descriptive Statistics

Panel A: Distributional Properties of Variables

	Regulation Period September 2003 - May 2007 (N = 72)			Deregulation Period June 2007 – December 2011 (N = 150)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
AQINDEX	0.495	0.525	0.250	0.455	0.428	0.248
DD	0.491	0.500	0.278	0.463	0.465	0.278
MDD	0.510	0.555	0.268	0.456	0.420	0.268
BS	0.483	0.515	0.295	0.446	0.445	0.270
Underpricing	0.481	0.355	0.492	0.320	0.174	0.464
Offer size	23.166	23.089	1.174	23.692	23.585	1.261
Age	2.594	2.639	0.614	2.706	2.565	0.527
Leverage	0.449	0.460	0.154	0.457	0.467	0.162
Top underwriter	0.292	0.000	0.458	0.393	0.000	0.490
Size	17.824	17.497	1.648	18.088	17.744	1.382
Return on assets	0.131	0.117	0.068	0.140	0.125	0.079
Sales growth	0.332	0.228	0.364	0.420	0.253	0.605
KOSPI	0.736	1.000	0.444	0.713	1.000	0.454
Hot market	0.361	0.288	0.273	0.306	0.245	0.216
Return volatility	0.049	0.048	0.015	0.047	0.045	0.015
Bid	5.354	5.780	1.480	4.847	5.658	2.126
Big4	0.431	0.000	0.499	0.613	1.000	0.489
DForeign	0.417	0.000	0.496	0.500	0.500	0.502
AdjAcc	-0.007	0.000	0.135	-0.003	0.000	0.104

Panel B: Accruals Quality and Underpricing

	Underpricing	
AQ	Regulation Period	Deregulation Period
Best	0.614	0.250
2	0.594	0.310
3	0.388	0.337
Worst	0.369	0.377

Panel A presents the descriptive statistics of variables used in the empirical analyses for

the regulation and deregulation periods. Panel B shows the quartile of underpricing by accruals quality quartile in which a larger number represents poorer accruals quality. DD = Dechow and Dichev (2002) model, MDD = Modified Dechow and Dichev (2002) model, and BS = Ball and Shivakumar (2006) model.

TABLE 3

Multivariate Analysis of Underpricing and Accruals Quality Index

Dependent Variable: Underpricing

Independent Variables	Model 1 Regulation Period (September 2003 – May 2007)	Model 2 Deregulation Period (June 2007 – December 2011)
Intercept	0.709	1.940*
	(0.42)	(1.69)
AQINDEX	**-0.182**	**0.341****
	(-0.81)	**(2.44)**
Offer size	-0.017	-0.074*
	(-0.20)	(-1.79)
Age	0.020	-0.006
	(0.21)	(-0.10)
Leverage	-0.492	-0.048
	(-1.30)	(-0.20)
Top underwriter	-0.178	-0.060
	(-1.52)	(-0.95)
Size	-0.002	0.004
	(-0.03)	(0.08)
Return on assets	-1.677**	-0.643
	(-2.33)	(-1.32)
Sales growth	-0.132	-0.069
	(-0.83)	(-1.05)
KOSPI	0.109	-0.225**
	(0.74)	(-2.19)
Hot market	-0.704***	0.262
	(-2.69)	(1.18)
Return volatility	-1.068	10.460***
	(-0.28)	(4.06)
Bid	0.139***	0.094***
	(4.22)	(5.06)
Big4	0.150	0.098
	(1.30)	(1.48)
DForeign	0.030	0.129*
	(0.23)	(1.93)
AdjAcc	0.122	0.214
	(0.35)	(0.66)
Year fixed effects	Included	Included
Industry fixed effects	Included	Included

Difference of coefficients on AQINDEX between regulation and deregulation periods		**0.523**** **(2.07)**
N	72	150
Adj. R^2	0.430	0.429

This table presents the multivariate regression results of my hypothesis, investigating the association between underpricing and accruals quality for the regulation (model (1)) and deregulation periods (model (2)). All variables are defined in the Appendix. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. Robust t-statistics are reported in brackets. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 4

Multivariate Analysis of Underpricing and Accruals Quality Index for Extended Time Period (1/2001-12/2011)

Panel A: Multivariate Analysis of Underpricing and Accruals Quality Index for Market Stabilization Period, Regulation Period and Deregulation Period

Dependent Variable: Underpricing

Independent Variables	Model 1 Market Stabilization Period (1/2001 – 8/2003)	Model 2 Regulation Period (9/2003 – 5/2007)	Model 3 Deregulation Period (6/2007 – 12/2011)
Intercept	0.285	0.709	1.940*
	(0.10)	(0.42)	(1.69)
AQINDEX	**-0.542**	**-0.182**	**0.341****
	(-1.58)	**(-0.81)**	**(2.44)**
Offer size	-0.082	-0.017	-0.074*
	(-0.47)	(-0.20)	(-1.79)
Age	-0.009	0.020	-0.006
	(-0.08)	(0.21)	(-0.10)
Leverage	-0.253	-0.492	-0.048
	(-0.55)	(-1.30)	(-0.20)
Top underwriter	0.049	-0.178	-0.060
	(0.25)	(-1.52)	(-0.95)
Size	0.030	-0.002	0.004
	(0.17)	(-0.03)	(0.08)
Return on assets	1.505	-1.677**	-0.643
	(1.09)	(-2.33)	(-1.32)
Sales growth	-0.081	-0.132	-0.069
	(-0.24)	(-0.83)	(-1.05)
KOSPI	-0.003	0.109	-0.225**
	(-0.01)	(0.74)	(-2.19)
Hot market	1.257***	-0.704***	0.262
	(2.87)	(-2.69)	(1.18)
Return volatility	13.391*	-1.068	10.460***
	(1.79)	(-0.28)	(4.06)
Bid	0.169***	0.139***	0.094***
	(2.81)	(4.22)	(5.06)

Big4	0.097	0.150	0.098
	(0.72)	(1.30)	(1.48)
DForeign	-0.022	0.030	0.129*
	(-0.13)	(0.23)	(1.93)
AdjAcc	1.329	0.122	0.214
	(1.55)	(0.35)	(0.66)
Year fixed effects	Included	Included	Included
Industry fixed effects	Included	Included	Included
N	39	72	150
Adj. R^2	0.424	0.430	0.429

Panel B: Multivariate Analysis of Underpricing and Accruals Quality Index for Total Regulation Period and Deregulation Period

Dependent Variable: Underpricing

Independent Variables	Model 1 Total Regulation Period (January 2001 – May 2007)	Model 2 Deregulation Period (June 2007 – December 2011)
Intercept	-0.889	1.940*
	(-0.66)	(1.69)
AQINDEX	**-0.344****	**0.341****
	(-2.05)	**(2.44)**
Offer size	0.000	-0.074*
	(0.00)	(-1.79)
Age	-0.054	-0.006
	(-0.65)	(-0.10)
Leverage	-0.134	-0.048
	(-0.50)	(-0.20)
Top underwriter	-0.134	-0.060
	(-1.41)	(-0.95)
Size	0.011	0.004
	(0.22)	(0.08)
Return on assets	-0.272	-0.643
	(-0.43)	(-1.32)
Sales growth	-0.100	-0.069
	(-0.81)	(-1.05)

KOSPI	0.128	-0.225**
	(1.16)	(-2.19)
Hot market	0.027	0.262
	(0.11)	(1.18)
Return volatility	3.329	10.460***
	(1.04)	(4.06)
Bid	0.141***	0.094***
	(3.66)	(5.06)
Big4	0.091	0.098
	(1.09)	(1.48)
DForeign	-0.020	0.129*
	(-0.19)	(1.93)
AdjAcc	0.317	0.214
	(0.97)	(0.66)
Year fixed effects	Included	Included
Industry fixed effects	Included	Included
Difference of coefficients on AQINDEX between total regulation (January 2001 – May 2007) and deregulation periods		**0.685**** **(3.19)**
N	111	150
Adj. R^2	0.333	0.429

Panel A of this table presents the multivariate regression results of my hypothesis, investigating the association between underpricing and accruals quality for market stabilization period from January 2001 to August 2003 (model (1)), regulation period from September 2003 to May 2007 (model (2)), and deregulation period from June 2007 to December 2011 (model (3)). Panel B of this table presents the multivariate regression results on the association between underpricing and accruals quality for total regulation period January 2001 to May 2007 (model (1)), and deregulation period from June 2007 to December 2011 (model (2)). All variables are defined in the Appendix. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. Robust t-statistics are reported in brackets. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 5

Multivariate Analysis of Underpricing and Accruals Quality Index for Regulation Period and Deregulation Period

Dependent Variable: Underpricing

Independent Variables	Model 1 Regulation Period (September 2003 – May 2007)	Model 2 Deregulation Period (June 2007 – December 2011)
Intercept	0.759	1.785
	(0.43)	(1.60)
AQ2	**-0.116**	**0.058**
	(-0.51)	**(0.76)**
AQ3	**-0.133**	**0.203****
	(-0.84)	**(2.25)**
AQ4	**-0.132**	**0.217****
	(-0.83)	**(2.03)**
Offer size	-0.014	-0.081*
	(-0.15)	(-1.93)
Age	0.003	-0.002
	(0.03)	(-0.04)
Leverage	-0.567	-0.050
	(-1.26)	(-0.20)
Top underwriter	-0.175	-0.060
	(-1.41)	(-0.93)
Size	0.000	0.007
	(-0.01)	(0.16)
Return on assets	-1.696**	-0.697
	(-2.14)	(-1.37)
Sales growth	-0.133	-0.058
	(-0.83)	(-0.85)
KOSPI	0.112	-0.225**
	(0.80)	(-2.10)
Hot market	-0.674**	0.274
	(-2.50)	(1.20)
Return volatility	-0.889	10.522***
	(-0.22)	(4.09)
Bid	0.137***	0.094***
	(3.97)	(5.00)
Big4	0.126	0.102
	(0.89)	(1.56)
DForeign	0.033	0.133**

	(0.25)	(2.03)
AdjAcc	0.112	0.244
	(0.31)	(0.75)
Year fixed effects	Included	Included
Industry fixed effects	Included	Included
N	72	150
Adj. R^2	0.410	0.428

This table presents estimates of IPO firms quartiles of accruals quality index on underpricing, for the regulation (model (1)) and deregulation periods (model (2)). To test the potential non-linearity between accruals quality and IPO underpricing, this specification includes the AQ quartile indicator variables (i.e., AQ2 to AQ4). All variables are defined in the Appendix. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. Robust t-statistics are reported in brackets. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 6

Regression of Underpricing on Accruals Quality Instrumental Variable

Dependent Variable: Underpricing

Independent Variables	Model 1 Regulation Period	Model 2 Deregulation Period
Intercept	1.677	1.058
	(0.93)	(0.97)
AQINDEX IV	**-1.344***	**0.879****
	(-1.71)	**(2.03)**
Offer size	-0.008	-0.100**
	(-0.09)	(-2.23)
Age	-0.061	-0.014
	(-0.55)	(-0.22)
Leverage	-0.241	-0.097
	(-0.53)	(-0.40)
Top underwriter	-0.211	-0.069
	(-1.59)	(-1.12)
Size	-0.006	0.002
	(-0.12)	(0.04)
Return on assets	-0.575	-1.063*
	(-0.48)	(-1.72)
Sales growth	-0.098	-0.124*
	(-0.57)	(-1.68)
KOSPI	0.149	-0.282***
	(0.89)	(-2.59)
Hot market	-0.946***	0.435*
	(-2.84)	(1.93)
Return volatility	-4.837	9.672***
	(-0.97)	(4.11)
Bid	0.151***	0.086***
	(3.71)	(4.87)
Big4	0.042	0.050
	(0.29)	(0.66)
DForeign	0.150	0.152**
	(1.03)	(2.33)
AdjAcc	0.111	0.258
	(0.28)	(0.86)
Year fixed effects	Included	Included
Industry fixed	Included	Included

effects		
N	72	150
Adj. R^2	0.074	0.368

This table reports the results of a two-stage instrumental variable (IV) approach to account for endogeneity of accruals quality and underpricing. I model the firm-specific determinants of accruals quality as follows: AQINDEX = a + α_0 offer size + α_1 age + α_2 leverage + α_3 top underwriter + α_4 size + α_5 return on assets + α_6 sales growth + α_7 KOSPI + α_8 hot market + α_9 return volatility + α_{10} Bid + α_{11} Big4 + α_{12} DForeign + α_{13} AdjAcc + α_{14} Asset Growth + α_{15} Net PPE + α_{16} Herf + α_{17} DPubDebt + year and industry fixed effects + ε, where asset growth, Net PPE, Herfindahl-Herschman Index, and public debt are the instrumental variables in the first stage. All other variables are defined in the Appendix. All regressions include year and industry fixed effects. Values of the *z* statistics are in brackets. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 7

Heckman Selection Model Estimates of the relation between Underpricing and Accruals Quality

Panel A: First-stage regression results for the determinants of survival

	Regulation Period		Deregulation Period	
	Coefficient	*z*-stat	Coefficient	*z*-stat
Intercept	-12.025	-0.26	-1.491	-0.40
Barrier to exit	**5.477****	**2.12**	**2.886***	**1.73**
Offer size	0.000	-0.43	-0.286*	-1.89
Age	1.215***	3.66	1.781***	6.75
Leverage	0.060	0.48	1.815**	2.38
Top underwriter	-0.110	0.00	-0.375*	-1.71
Size	0.195	0.85	0.188	1.27
Return on assets	-5.310**	-2.16	-2.254	-1.40
Sales growth	-0.381	-1.15	0.058	0.75
KOSPI	-0.938	-1.39	-0.121	-0.27
Hot market	-1.145	-0.66	0.352	0.64
Return volatility	-7.576	-0.14	-12.045	-1.34
Bid	-0.214	-1.76	-0.054	-0.84
Big4	-0.416	-1.11	0.219	0.94
DForeign	0.742**	2.22	0.170	0.75
AdjAcc	-0.892	-1.03	-0.829	-0.95
Year fixed effects	Included		Included	
Industry fixed effects	Included		Included	
lamda	0.110	0.59	-0.129	-0.81
N	180		248	

Panel B: Second-stage regression results for the determinants of underpricing

	Regulation Period		Deregulation Period	
	Coefficient	*t*-stat	Coefficient	*t*-stat
Intercept	0.595	0.35	2.064*	1.80
AQINDEX	**-0.201**	**-0.90**	**0.354****	**2.57**

Offer size	-0.014	-0.16	-0.060	-1.46
Age	0.065	0.45	-0.090	-0.89
Leverage	-0.492	-1.27	-0.149	-0.58
Top underwriter	-0.181	-1.57	-0.032	-0.46
Size	-0.003	-0.04	0.000	0.00
Return on assets	-1.893**	-2.26	-0.450	-0.83
Sales growth	-0.162	-0.98	-0.067	-1.02
KOSPI	0.076	0.47	-0.209**	-2.05
Hot market	-0.713***	-2.73	0.248	1.13
Return volatility	-1.480	-0.36	10.966***	4.11
Bid	0.135***	3.97	0.093***	5.10
Big4	0.132	1.03	0.091	1.38
DForeign	0.053	0.39	0.117*	1.76
AdjAcc	0.078	0.21	0.294	0.88
Inverse Mills ratio	0.110	0.48	-0.172	-1.07
Year fixed effects	Included		Included	
Industry fixed effects	Included		Included	
N	72		150	
Adj. R^2	0.420		0.429	

This table presents the selection adjusted estimates using a maximum likelihood estimator (MLE) version of the Heckman (1979) selection model to examine the effect of accruals quality on underpricing for the regulation and deregulation periods. The dependent variables are survival and underpricing in Panel A and B, respectively. Panel A provides the results for the first-stage regression model in the Heckman selection model as follows: SURVIVAL= a + α_0 offer size + α_1 age + α_2 leverage + α_3 top underwriter + α_4 size + α_5 return on assets + α_6 sales growth + α_7 KOSPI + α_8 hot market + α_9 return volatility + α_{10} bid + α_{11} Big4 + α_{12} DForeign + α_{13} AdjAcc + α_{14} Barrier to exit + year and industry fixed effects + ε. Panel B shows the results based on the second-stage regression model that includes the Inverse Mill's ratio, which is: Underpricing = a + α_0 AQINDEX + α_1 offer size + α_2 age + α_3 leverage + α_4 top underwriter + α_5 size + α_6 return on assets + α_7 sales growth + α_8 KOSPI + α_9 hot market + α_{10} return volatility + α_{10} bid + α_{11} Big4 + α_{12} DForeign + α_{13} AdjAcc + α_{14} Inverse Mill's ratio + year and industry fixed effects + ε. All variables are defined in the Appendix. All regressions include year and industry fixed effects. In the second-stage regression, to adjust for heteroskedasticity, standard errors are clustered at the firm-level. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 8

The Effect of Ownership by Large Shareholders and Related Parties on the association between Underpricing and Accruals Quality

Dependent Variable: Underpricing

	Model 1		Model 2	
Independent Variables	Regulation Period	Deregulation Period	Regulation Period	Deregulation Period
Intercept	0.730	1.652	1.219	1.635
	(0.44)	(1.47)	(0.69)	(1.46)
AQINDEX	**-0.204**	**0.341****	**-0.242**	**0.334****
	(-0.88)	**(2.42)**	**(-1.01)**	**(2.28)**
Offer size	-0.023	-0.071*	-0.033	-0.069
	(-0.27)	(-1.71)	(-0.38)	(-1.61)
Age	-0.011	0.008	-0.006	0.008
	(-0.10)	(0.10)	(-0.05)	(0.10)
Leverage	-0.446	-0.061	-0.324	-0.052
	(-1.12)	(-0.25)	(-0.74)	(-0.21)
Top underwriter	-0.159	-0.061	-0.145	-0.059
	(-1.32)	(-0.96)	(-1.18)	(-0.93)
Size	-0.004	0.004	-0.008	0.004
	(-0.07)	(0.11)	(-0.13)	(0.10)
Return on assets	-1.631**	-0.651	-1.454*	-0.633
	(-2.19)	(-1.35)	(-1.76)	(-1.27)
Sales growth	-0.123	-0.072	-0.162	-0.074
	(-0.79)	(-1.08)	(-0.94)	(-1.08)
KOSPI	0.116	-0.223**	0.101	-0.218**
	(0.78)	(-2.16)	(0.65)	(-1.99)
Hot market	-0.697**	0.264	-0.694**	0.265
	(-2.59)	(1.20)	(-2.53)	(1.20)
Return volatility	-1.146	10.586***	-1.036	10.509***
	(-0.30)	(3.99)	(-0.26)	(3.91)
Bid	0.143***	0.094***	0.138***	0.094***
	(4.08)	(5.08)	(3.74)	(5.17)
Big4	0.146	0.098	0.142	0.098
	(1.26)	(1.48)	(1.17)	(1.47)
DForeign	0.049	0.131**	0.073	0.131**
	(0.37)	(1.99)	(0.53)	(1.98)
AdjAcc	0.157	0.199	0.129	0.210
	(0.46)	(0.60)	(0.37)	(0.64)
Largest	0.312	-0.115	-1.115	-0.383

Shareholder				
	(0.93)	(-0.46)	(-0.66)	(-0.36)
Largest Shareholder^2			1.631	0.288
			(0.83)	(0.26)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
N	72	150	72	150
Adj. R^2	0.427	0.426	0.423	0.422

This table presents estimates of IPO firms accruals quality on underpricing for the regulation and deregulation periods after controlling for the effect of ownership by largest shareholders and reported parties. Model (1) is estimated by including Largest Shareholder which captures shareholdings of largest shareholders and related parties' while model (2) includes also the square of Largest Shareholder to capture potential non-linearity between ownership and underpricing. All variables are defined in the Appendix. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. Robust t-statistics are reported in brackets. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 9

Panel A: Regression Results using Firm Fixed Effect measure of Accruals Quality

Dependent Variable: Underpricing

	Model 1		Model 2	
Independent Variables	Regulation Period	Deregulation Period	Regulation Period	Deregulation Period
Intercept	0.629	1.360	0.665	1.745
	(0.38)	(1.24)	(0.40)	(1.58)
FDD	**-0.048**	**0.256****		
	(-0.22)	**(2.09)**		
AQINDEX_FDD			**-0.160**	**0.384****
			(-0.68)	**(2.56)**
Offer size	-0.018	-0.063	-0.017	-0.074*
	(-0.21)	(-1.58)	(-0.20)	(-1.80)
Age	0.032	-0.003	0.024	-0.008
	(0.33)	(-0.04)	(0.24)	(-0.12)
Leverage	-0.505	-0.081	-0.481	-0.053
	(-1.33)	(-0.32)	(-1.26)	(-0.22)
Top underwriter	-0.159	-0.059	-0.164	-0.062
	(-1.36)	(-0.93)	(-1.42)	(-0.99)
Size	-0.002	0.013	-0.003	0.010
	(-0.04)	(0.34)	(-0.04)	(0.25)
Return on assets	-1.768**	-0.520	-1.666**	-0.639
	(-2.38)	(-1.07)	(-2.29)	(-1.32)
Sales growth	-0.139	-0.048	-0.134	-0.067
	(-0.83)	(-0.79)	(-0.83)	(-1.07)
KOSPI	0.105	-0.195*	0.108	-0.221**
	(0.68)	(-1.90)	(0.73)	(-2.17)
Hot market	-0.666**	0.240	-0.691**	0.289
	(-2.47)	(1.15)	(-2.62)	(1.34)
Return volatility	-0.498	10.638***	-0.895	10.339***
	(-0.14)	(4.17)	(-0.24)	(4.07)
Bid	0.140***	0.099***	0.140***	0.095***
	(3.99)	(5.47)	(4.20)	(5.27)
Big4	0.174	0.116*	0.162	0.094
	(1.43)	(1.72)	(1.41)	(1.43)
DForeign	0.010	0.128*	0.023	0.132**
	(0.08)	(1.89)	(0.17)	(1.99)

AdjAcc	0.191	0.371	0.186	0.358
	(0.55)	(1.24)	(0.55)	(1.24)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
N	72	150	72	150
Adj. R^2	0.424	0.426	0.430	0.436

Panel B: Regression Results using (Performance-Adjusted) Discretionary Accruals Model

Dependent Variable: Underpricing

	Model 1		Model 2	
Independent Variables	Regulation Period	Deregulation Period	Regulation Period	Deregulation Period
Intercept	-2.153**	0.348	-2.192**	0.408
	(-2.11)	(0.46)	(-2.14)	(0.53)
DiscAcc	**-0.006**	**0.535*** **		
	(-0.03)	**(2.84)**		
AdjDiscAcc			**0.092**	**0.404** **
			(0.47)	**(2.27)**
Offer size	0.062	-0.049	0.065	-0.050
	(1.37)	(-1.59)	(1.43)	(-1.59)
Age	-0.011	0.047	-0.009	0.049
	(-0.21)	(1.26)	(-0.17)	(1.30)
Leverage	-0.334	-0.024	-0.322	-0.054
	(-1.55)	(-0.15)	(-1.50)	(-0.33)
Top underwriter	-0.090	0.015	-0.086	0.008
	(-1.52)	(0.34)	(-1.46)	(0.18)
Size	0.019	0.019	0.017	0.017
	(0.72)	(0.55)	(0.67)	(0.51)
Return on assets	-0.763**	-0.382	-0.765**	-0.317
	(-2.20)	(-1.44)	(-2.22)	(-1.16)
Sales growth	-0.031	-0.011***	-0.030	-0.011***
	(-0.71)	(-4.90)	(-0.68)	(-4.77)
KOSPI	0.155	-0.193**	0.150	-0.177**
	(1.33)	(-2.29)	(1.28)	(-2.05)
Hot market	0.330**	0.360***	0.330**	0.346***
	(2.04)	(2.89)	(2.04)	(2.70)

Return volatility	9.052***	10.645***	8.904***	10.614***
	(4.09)	(5.46)	(4.05)	(5.46)
Bid	0.138***	0.091***	0.139***	0.089***
	(5.22)	(8.35)	(5.28)	(8.25)
Big4	0.015	0.102**	0.014	0.111**
	(0.26)	(2.22)	(0.25)	(2.41)
DForeign	0.011	0.079*	0.008	0.081*
	(0.17)	(1.76)	(0.12)	(1.78)
Year fixed effects	Included	Included	Included	Included
Industry fixed effects	Included	Included	Included	Included
N	195	264	195	264
Adj. R^2	0.339	0.426	0.340	0.415

Panel C: Regression Results using Accruals Quality measure that incorporates future cash flow from operations

Dependent Variable: Underpricing

	Model 1	Model 2
Independent Variables	Regulation Period	Deregulation Period
Intercept	-0.569	0.538
	(-0.39)	(0.65)
AQINDEX_FUTURE	**-0.109**	**0.302*** **
	(-0.49)	**(2.72)**
Offer size	0.009	-0.066*
	(0.14)	(-1.88)
Age	0.042	0.027
	(0.41)	(0.50)
Leverage	-0.385	-0.055
	(-1.13)	(-0.29)
Top underwriter	-0.085	-0.024
	(-0.83)	(-0.39)
Size	0.004	-0.003
	(0.09)	(-0.10)
Return on assets	-0.676	-0.438
	(-0.96)	(-1.17)
Sales growth	-0.032	-0.107**
	(-0.38)	(-2.23)

KOSPI	0.081	-0.197**
	(0.50)	(-2.00)
Hot market	0.303	0.390*
	(1.07)	(1.92)
Return volatility	3.396	11.807***
	(0.89)	(5.08)
Bid	0.142***	0.097***
	(3.87)	(6.93)
Big4	0.016	0.103*
	(0.15)	(1.72)
DForeign	-0.012	0.127**
	(-0.12)	(2.23)
AdjAcc	0.064	0.091
	(0.17)	(0.31)
Year fixed effects	Included	Included
Industry fixed effects	Included	Included
N	100	186
Adj. R^2	0.231	0.444

Panel A of this table presents results based on the firm-fixed effect (FDD) accruals quality model which is equivalent to the DD model except that firm fixed effects and year effects are added and estimated in a panel regression framework. Model (1) uses FDD as an alternative measure of AQ while model (2) employs AQINDEX_FDD, the average of DD, MDD, BS, and FDD models, as an alternative measure of AQ. Panel B shows results based on the residual of the Jones (1991) discretionary accruals model (Model (1)) and results based on the residual of performance matched discretionary accruals model following Kothari et al. (2005), for regulation and deregulation periods. Due to the less strict data requirements, the number of observations increases to 195 and 264 for regulation and deregulation periods, respectively. Panel C shows results using AQINDEX_FUTURE as the variable of interest. This model is equivalent to the AQINDEX model except CFO_{t-2} is replaced with CFO_{t+1} to incorporate effects from future operating cash flows. Similar to Panel B, the less strict data requirements increases the number of observations to 100 and 186 for regulation and deregulation periods, respectively. All variables are defined in the Appendix. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. Robust t-statistics are reported in brackets. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

Essay 2
Accruals Quality and Split Bond Ratings: Evidence from Korea

I. Introduction

Prior research provides mixed evidence on the relation between information risk and firm's cost of capital. A line of studies on the equity market argue that information uncertainty risk, measured by accruals quality, is a priced factor (Easely and O'Hara 2004; Francis et al. 2005; Bhattacharya et al. 2013) while other research challenges these predictions (Hughes et al. 2005; Easley and O'Hara 2004; Core et al. 2008). Distinct from prior studies that focus on the equity market, I examine the bond market consequence of accruals quality because it enriches the understanding on the effects of accruals quality relevant to debt market participants who have qualitatively different concerns from equityholders about the financial statement and allows me to assess trade-offs between multiple incentives for producing high-quality earnings (Dechow et al. 2010).

Accounting-based numbers are a persistent and traditional standard used by creditors to assess firm health and viability (Anderson et al. 2004). In Standard & Poor's (S&P) guide (Standard & Poor's 2008), it states that "analysis of cash flow patterns can reveal a level of debt-servicing capability that is either stronger or weaker than might be apparent from earnings", which underscores the importance of cash flows and earnings quality to credit rating agencies as well as corporate bond investors. Further, reported accounting ratios are significantly associated with firms' bond ratings (Kaplan and Urwitz 1979; Blume et al. 2006) and the probability of default (Beaver 1966; Altman 1968; Beaver et al. 2010).

An important attribute of the quality of accounting information is the extent to which accruals map into cash flows. A poor mapping of accruals into cash flows reduces the information content of reported earnings and results in lower quality earnings (Bhattacharya et al. 2013). Analytical models predict that poor

information quality increases the estimation risk[32] (Bawa, Brown, and Klein 1979) by increasing investors' uncertainty in assessing the assets' payoff distribution, and exacerbates information asymmetry in financial markets (Diamond and Verrechhia 1991; Kim and Verrecchia 1994). Thus, poor quality of public information, measured by the mapping between accruals and cash flows, will increase the uncertainty of credit risk of a firm because it both increases the estimation risk and information asymmetry. Given the significant role of accounting information in the rating process and motivated by the lack of investigation into the relation between accruals quality and the bond market (Dechow et al. 2010), I examine whether poor earnings quality is associated with the rating processes by credit rating agencies.

The limited empirical evidence on the bond market indicate that, overall, the cost of debt increases when earnings quality is lower (Anderson et al 2004; Francis et al. 2005; Yu 2005; Graham et al. 2008; Bhojraj and Swaminathan 2009). Similarly, several studies establish a link between uncertainty about credit risk and disagreement between rating agencies (i.e., split bond ratings). For instance, Morgan (2002) and Ederington (1986) suggest that credit rating agencies disagree more often (i.e., higher frequency of split ratings) when reporting firms' credit risk is harder to assess. Recent studies provide evidence that some aspects of financial reporting such as comparability or conservatism are associated with lower frequency of split bond ratings by credit rating agencies (Akins 2012; Cheng 2012; Kim et al. 2013).

Consistent with the overall findings on the bond market, I argue that precise accounting information reduces the information risk of the users of the financial statements (i.e., the credit rating agencies and corporate bond

[32] See Brown (1979), Barry and Brown (1984, 1985), Coles and Loewenstein (1988), and Coles, Loewenstein, and Suay (1995) for studies on estimation risk in finance.

investors), and thereby affect the frequency and magnitude of split bond ratings by credit rating agencies via two routes. First, better accruals quality enhances the estimates of future cash flows from which the debt repayment of both interest payment and loan principal at maturity will be served. In other words, high quality of accounting information will reduce the estimation risk or errors by narrowing the range of expected future cash flows, thus lowering the frequency of split ratings. Second, increasing the precision of public information should reduce information asymmetry among bond market participants (Diamond and Verrecchia 1991), assuming that informed participants do not have superior ability to process earnings related information (Kim and Verrecchia 1994; Gow et al. 2011). While the evidence is mixed as to whether this assumption holds, I argue that, even in cases with investors having differential ability to process information, better accruals quality (i.e., good mapping between earnings and cash flows) decreases information asymmetry by enabling less informed investors to conduct simple and standardized but still effective financial analyses (Kim et al. 2013). As a result, I expect bond market participants to interpret given information in a similar manner for firms with better accruals quality. Due to the abovementioned two effects, I expect firms with more precise accounting information to have lower frequency and magnitude of split bond ratings.

To investigate the role of accruals quality in the bond market, I examine the Korean bond market. I use a single-country analysis for several reasons. First, a within-country analysis enables me to compute more precise measures of accruals quality. The challenge faced by studies that use cross-country analyses is that it is extremely difficult to obtain proper proxies of accruals quality. Second, as firms in the same country face the same institutional environment, a single-country analysis can mitigate endogeneity problems (Joh, 2003, p. 289).

For example, many studies have shown that much of the cross-country financial reporting differences and bond market differences can be explained by country-level factors such as legal institutions and capital availabilities (La Porta et al., 1999; Masulis et al., 2011).

Third, Korea provides an ideal setting in which I can obtain more accurate measures of split bond ratings. In the U.S., the credit rating industry is characterized by the extreme concentration of two rating agencies, S&P and Moody's.[33] The two rating agencies control the vast majority of market share and automatically assign ratings to all corporate bonds issued in U.S. public markets. However, other rating agencies provide ratings only when requested by issuers and they have a tendency to assign ratings that are higher than those provided by S&P or Moody's (Cantor and Packer 1997). Thus, it is likely that split rating measures obtained by using more than two rating agencies in the U.S. may reflect differences in motivations for providing the rating. Even if the frequency of split rating is obtained using only S&P and Moody's, a problem arises because the correspondence between the rating letters and measures of default risk is not the same between the two agencies as shown in Appendix A (Cantor and Packer 1997). Because of the different rating symbols used by the two rating agencies, it is possible that split ratings may be due to differences in rating scales.

In contrast, the three rating agencies in Korea which are Korea Investors Service (KIS), NICE, and Korea Ratings (KR), share similar history, length of experience, market dominance in the past three decades, all provide ratings on a solicited basis, and use the same rating scales. Thus, the characteristics of the three rating agencies in Korea enable me to obtain more accurate measures of split bond rating by eliminating splits caused by differences in market share,

[33] http://financialservices.house.gov/media/pdf/062905ox.pdf

motivations for providing the rating, and rating scale. Finally, the corporate bond market is well developed in South Korea as firms have relied heavily on debt as their primary source of financing. The amount of outstanding corporate debt securities represent 24.8 percent of gross domestic product (GDP) in 2004, compared to 23.4 percent for the U.S. (Luengnaruemitchai and Ong 2005). In summary, the characteristics of credit rating agencies and Korean institutions offer an ideal setting in which to examine the relation between accruals quality and split bond ratings.

Using several accruals-based measures of accruals quality developed by Dechow and Dichev (2002), McNichols (2002), and Ball and Shivakumar (2006) that better capture the information risk of a firm (Bhattacharya et al. 2013), I test for the association between accruals quality and the frequency and magnitude of split bond ratings. Consistent with expectations, based on a sample of 2,468 observations for public bonds during the period 2000-2010 in Korea, I find that accruals quality is significantly negatively associated with the frequency and magnitude of split bond ratings after controlling for an extensive set of control variables. The results confirm my expectations that precise accounting information reduces debt market participants' disagreement about reporting firms' credit risk.

I next examine several factors that influence the relation between accruals quality and split bond ratings. The objective of such tests is to examine whether the effect of poor accruals quality becomes particularly stronger in situations where information asymmetry is higher. I expect that information risk posed by lower accruals quality should be exacerbated for firms with high information asymmetry. The empirical results are consistent with my predictions, strongly supporting the negative relation between accruals quality and split bond ratings.

I acknowledge that endogeneity is an important challenge to my findings in

that accruals quality can be an endogenous variable in the sense that certain firm characteristics that affect accruals quality might also affect the consequences of poor quality such as credit risks of a firm. For example, firm size may affect both accruals quality and credit risks and thus bias the regression estimates in the absence of proper controls. To alleviate the concern, I use several approaches including a Heckman (1979) procedure, examining firms that experienced deteriorating accruals quality, and several interaction tests. More importantly, the results are robust after addressing the issue of endogeneity of accruals quality. Section 6 describes in detail how I address the concern.

To the extent that corporate governance reduces information asymmetry through its positive effects on the quality and quality of corporate disclosures (Ajinkya et al. 2005; Karamanou and Vafeas 2005), it is possible that governance structure is a correlated omitted variable in my models. To examine this possibility, I additionally include measures of corporate governance and conduct subsample analyses. The main results remain unchanged and the subsample analyses show that the negative relation between poor accruals quality and credit risks of a firm is magnified in firms with low corporate governance structure. To further assess the robustness of my findings, I use alternative measures of credit risk (i.e., bond spread and average bond ratings), incorporate the potential non-linearity relation between accruals quality and credit risks, and rule out other alternative explanations by including additional control variables.

The paper makes several contributions to the literature. First, to the best of my knowledge, this is the first study that directly investigates the role of information precision, measured by accruals quality, in the bond market using measures of split bond ratings. Second, given my focus on the relation between

accruals quality and the debt market, this study contributes to the literature on the debt market consequences of accruals quality. It complements studies that investigate the impact of information quality on credit risk (Francis et al. 2005; Anderson et al 2004; Bhojraj and Swaminathan 2009; Yu 2005; Graham et al. 2008) by showing that variation in accounting quality substantially explains the causes of split bond ratings and the magnitude of credit spread. Importantly, the study sheds light on the line of studies that examine capital market consequences of earnings quality as I focus on the bond market that is distinct from equity market as the bond market tends to be less liquid, competitive, and cares more about the default or downside risk, rather than the upside potential.

Although my sample is restricted to corporate bonds that receive bond ratings and the generalizability of this study could be an issue as a result of unknown institutional differences, my findings should be of interest to standard-setters, practitioners, rating agencies, and academicians concerned with the determinants and consequences of accruals quality in the bond market.

The rest of the paper proceeds as follows. In Section 2, I review the institutional background, conduct literature review, and develop hypotheses on the relation between accruals quality and credit risk. Section 3 presents the research design and specifies the empirical models. In Section 4, I describe the data, variables, sample characteristics, and provide descriptive statistics. Section 5 and 6 present the main empirical results, and the results of additional analyses that show further evidence supporting my hypothesis, respectively. Finally, I present summary and concluding remarks in Section 7.

II. Institutional Background, Literature Review and Hypotheses Development

2.1 Institutional Background

In the U.S., two rating agencies, Moody's and S&P, dominate the U.S. credit rating industry, which began their rating operations in 1916 and 1922, respectively. Both agencies have a policy of rating all corporate bonds publicly issued in the U.S. regardless of whether they have been asked by an issuer. While two other U.S. rating agencies, Fitch and Duff & Phelps Credit Rating Agency (DCR), also have a long history, they do not rate all bonds, but only those on the request of the issuer. The market for credit rating agencies in the U.S. is well summarized by the words of Michael Oxley, the House Financial Services committee Chairman:

"I am troubled by the extreme concentration in this [credit rating] industry. Two firms control the vast majority of market share. To put it mildly, this is not an efficient market with robust competition. Rather, it has been identified, accurately I might add, as a 'duopoly', a 'shared monopoly,' and a 'partner monopoly.'"[34]

The bond ratings of all four agencies in U.S. are comparable in the sense that they measure the likelihood of the default or delayed payment of a security. However, although each agency's ranking of relative default risks is simple to understand, the correspondence between their rating symbols and measures of default risk has not been made explicit by the agencies. S&P, DCR, and Fitch all use the same basic set of rating symbols, but Moody's uses a slightly different system (Cantor and Packer 1977). Panel A of Appendix A provides the standard correspondence drawn by both the regulatory and investment communities between Moody's ratings and those of the other rating agencies (Table 1 of Cantor and Packer 1977).

The two rating agencies control the vast majority of market share and automatically assign ratings to all corporate bonds issued in U.S. public markets.

[34] http://financialservices.house.gov/media/pdf/062905ox.pdf

However, firms rated severely by Moody's and S&P are more likely to seek a third rating and it is known that Fitch has a tendency to assign higher average ratings than those by Moody's or S&P (Cantor and Packer 1997). Thus, it is likely that split rating measures obtained by using more than two rating agencies in the U.S. may reflect differences in the motivations for providing the rating. Further, even if the frequency of split rating is obtained using only S&P and Moody's, a problem arises because the correspondence between the rating letters and measures of default risk are not the same. Appendix A, Panel A shows the comparison in standard correspondence between rating symbols and measures of default risk for the credit rating agencies in the U.S. Because of the different rating symbols used by the two rating agencies, it is possible that split ratings may be due to differences in rating scales.

The industry for rating agencies is different in Korea compared to the U.S. in three respects. In Korea, there are three main credit rating agencies that issue ratings for corporate bonds, commercial paper, and other miscellaneous securities of a firm. These rating agencies are KIS, NICE, and KR which were founded in 1985, 1986, and 1983, respectively. The first difference is that all three institutes share similar history, length of experience, and have proportionate market dominance in the past three decades. For example, the market shares in the credit rating industry for KR, KIS, and NICE in 2009 are 33.3%, 32.9%, and 33.4%, respectively[35]. In contrast to the shared monopoly between Moody's and S&P prevalent in the U.S., the rating agencies industry in Korea is much more balanced in terms of their sales, market share, reputation, and power. Secondly, all three rating agencies provide ratings only when requested by an issuer for a rating. Compared to the situation in the U.S. where all corporate bonds automatically receive a rating from both S&P and Moody's,

[35] Reported by Financial Supervisory Service in Korea on April 13, 2010.

bond-issuing firms in Korea are under less pressure to obtain a "third rating" because they only need one good rating that meets the minimum rating cutoff.

Third, as mentioned above, there is a mismatch in the correspondence between the rating letters and measures of default risk for S&P and Moody's. In Korea, the rating symbol and measures of default risks are almost identical across all three credit rating agencies as shown in Appendix A, Panel B and C. In summary, the characteristics of the three rating agencies in Korea enable me to obtain more accurate measures of split bond rating by eliminating splits caused by differences in market share, rating scales, and motivations for providing a bond rating.

2.2 Literature Review

2.2.1 Split Bond Ratings and Credit Risk

Credit rating agencies have been an active participant of the capital markets by independently evaluating the credit worthiness of debt securities and assessing the likelihood of their repayment. Previous literature suggests that these credit rating changes communicate important information to investors and affect returns (Hand et al. 1992; Goh and Ederington 1993; Kliger and Sarig 2000; Dichev and Piotroski 2001). Despite the importance of these ratings, the agencies often disagree about credit ratings, and this disagreement is driven, at least in part, by uncertainty about credit risk (Morgan 2002).

Several studies investigate the causes and consequences of split ratings. While early research suggests that split ratings are random (Ederington 1986), other studies find conflicting results. Billingsley et al. (1985) provides a counter-argument that split ratings occur because the agencies disagree about a bond's the default risk. Other studies that search for the causes of split ratings find evidence that disagreements about credit ratings are in part due to asset opacity. For instance, Morgan (2002) finds banks are inherently more opaque as

bank trading assets and bank loans increase the uncertainty about the bank's credit risk. Livingston et al. (2007) extend these findings by establishing a positive link between measures of asset opaqueness and uncertainty about credit risk.

Importantly, subsequent research indicates that split ratings have real economic consequences. For instance, research on the outcomes of credit risk uncertainty examines whether split ratings affect the cost of debt capital, influence firms to obtain a third rating, or potentially impact derivative pricing (Xia 2013). More recent studies find evidence consistent with investors demanding a higher yield on split rated bonds (Livingston and Zhou 2010; Cheng 2011), thus leading to higher cost of debt capital. Firms that receive split ratings are also more likely to incur the cost of obtaining a third rating, consistent with the notion that split ratings indicate uncertainty and that firms attempt to reduce this by obtaining an additional rating (Beattie and Searle 1992; Jewell and Livingston 2000).[36] In summary, split bond ratings, which capture the level of heterogeneity on credit risk of a firm among credit rating agencies, have real consequences on the debt market.

2.2.2 Accruals Quality and Credit Risk

In the Standard & Poor's (S&P) bond rating manual (Standard & Poor's 2008), it states that "interest or principal payments cannot be serviced out of earnings" and "payment has to be made with cash." Information about cash flow and accruals quality is important because "analysis of cash flow patterns can reveal a level of debt-servicing capability", making cash flow analysis

[36] Additional research on the effect of split ratings shows that split ratings on bonds issued below investment grade significantly increase underwriter fees charged to issuing firms (Jewell and Livingston 1998). Also, Livingston et al. (2008) find that split rated bonds have higher ratings volatility, which could lead to the mispricing of credit spread options and increases value-at-risk (VaR) in some risk management models.

“critical in all credit rating decisions.” This quotation highlights the importance of cash flows and accruals quality to credit rating agencies and corporate bond investors. Yet existing research has largely focused on the equity market.

The empirical evidence on the debt market indicates that, overall, the cost of debt appears to be higher when earnings quality is low. For example, Francis et al. (2005) find that firms with lower quality accruals have a higher cost of debt, measured by the ratio of interest expense to interest-bearing debt. Anderson et al. (2004) document that firms with good corporate governance quality is associated with lower yield spreads. Bhojraj and Swaminathan (2009) find that firms with high operating accruals have significantly lower one-year-ahead bond returns, consistent with evidence from the equity market.

A line of literature establishes a link between uncertainty about credit risk and disagreement between rating agencies (i.e., split bond ratings). For instance, Morgan (2002) and Ederington (1986) suggest that credit rating agencies disagree more often when firms’ credit risk is harder to assess. Recent studies provide evidence that some aspects of financial reporting such as comparability or conservatism are associated with lower frequency of split bond ratings by credit rating agencies (Kim et al. 2013; Akins 2012; Cheng 2012). Consistent with these findings, I expect debt market participants to have lower uncertainty about the credit risk for firms with precise accruals quality.

The relation between financial reporting and credit ratings is also explored in the Korean setting. For instance, Park and Kim (2009) document that earnings persistence is positively related to credit rating scores while Park, Park, and Park (2012) provide evidence that firms receive lower credit rating scores from rating agencies when the firms engage in accrual- or real-earnings management. Further, characteristics of a firm such as enhanced internal control system, corporate governance mechanism (i.e., higher foreign ownership and

independent outside members of the board), Big 4 auditor, lower book-tax-difference (BTD) significantly contribute to higher credit ratings (Kim and Kim 2007; Moon et al. 2011; Park et al. 2011; Chae et al. 2012). Although these studies investigate the role of an aspect of financial reporting in forming credit ratings, none of these studies employ the use of disagreement among credit rating agencies that have real consequences, nor use the more enhanced measure of accruals quality.

2.3 Hypotheses Development

In this section, I develop hypotheses about the effects of accruals quality on proxies for debt market participants' uncertainty about a firm's credit risk. There is ample evidence in the accounting and finance literature that accruals quality, measured by the mapping between accruals and cash flows, captures the certainty or precision of public information. Bhattacharya et al. (2013) report that firms with poor mapping of accruals into cash flows display reduced information content of reported earnings, and thus high information asymmetry, proxied by the price impact of trade as well as the bid-ask spread. Accruals quality explains a wide range of capital market outcomes. In a study that investigates mergers and acquisitions, McNichols and Stubben (2012) document that when target firms have higher accruals quality, acquirer returns around the acquisition announcement are higher and target returns are lower, consistent with higher-quality accounting information reducing uncertainty in the target's value. Lee and Masulis (2009) find that poor accounting information quality, proxied by accruals quality, is associated with more negative market reaction to equity offer announcements.

For my hypothesis, I argue that precise accounting information reduces the information risk of the users of the financial statements (i.e., the credit rating agencies and corporate bond investors), and thereby affect the frequency and

magnitude of split bond ratings by credit rating agencies via two routes. First, better accruals quality enhances the estimates of future cash flows from which the debt repayment of both interest payment and loan principal at maturity will be served. In other words, high quality of accounting information will reduce the estimation risk or errors by narrowing the range of expected future cash flows and result in lower frequency and magnitude of split ratings.

Second, increasing the precision of public information should reduce information asymmetry among bond market participants (Diamond and Verrecchia 1991), assuming that informed participants do not have superior ability to process earnings related information (Kim and Verrecchia 1994; Gow et al. 2011). Prior studies show mixed evidence on whether this assumption holds. While some studies argue that information asymmetry decreases with firms' accounting quality (Welker 1995; Healy et al. 1999; Leuz and Verrecchia 2000), others document contrary findings in situations where markets are imperfect or informed investors have significant advantages in processing and interpreting public information (Gow et al. 2011; Ball et al. 2012).

I argue that, even in cases with investors having differential ability to process information, better accruals quality (i.e., good mapping between earnings and cash flows) decreases information asymmetry by enabling less informed investors to conduct simple and standardized but still effective financial analyses (Kim et al. 2013). Due to the abovementioned two effects, I expect firms with more precise accounting information to have lower frequency and magnitude of split bond ratings.

Based on the above discussion, I formulate my first hypothesis as follows:

H1: Firms with poor accounting quality are expected to have greater likelihood of split bond rating and higher magnitude of rating difference.

I next examine several factors that influence the relation between accruals

quality and credit risk of a firm to test whether the negative effect of poor accruals quality becomes particularly stronger in situations where information asymmetry is higher. I focus on the following five sets of factors to capture information asymmetry: volatility in bond ratings, whether or not the firm is delisted, volatility in profitability, whether or not the bonds are issued using private placement vs. public offering, and hiring of less reputable underwriter.

First, I expect that as uncertainty about the future payoffs of debtholders increases, it raises the level of information asymmetry between a firm and credit rating agencies. To measure uncertainty about the future payoffs of debtholders, I use the following three variables, б(*Bond Rating*) (volatility of bond ratings), *Delisted* (whether or not the firm is delisted), and б(*ROA*) (volatility of profitability). Livingston et al. (2008) find higher ratings volatility is associated with higher credit risks, measured by mispricing of credit spread options and higher value-at-risk (VaR). Also, I use an indicator variable for firms that subsequently delist after issuing bonds, as firms likely delist firm the stock market, when they are not able to raise equity to pay back debt (Pour and Lasfer 2013). I use volatility of profitability to proxy for volatility of assets, which is one of the three components that define default risk by the Merton model. I use the three measures as a proxy for the level of information asymmetry between issuers and credit rating agencies.

I use two additional variables, method of bond issue and reputation of underwriter, to proxy for information asymmetry between investors and issuers surrounding bond issues. Firms that issue bonds through private placement, rather than public offering, have higher level of information asymmetry (Wu 2004).[37] One mechanism that could mitigate the uncertainty is the presence of a

[37] Wu (2004) finds that firms that used the method of private placement to issue equity have a higher level of information asymmetry than firms that used public offering.

reputable intermediary institution that certifies the earnings of bond-issuing firms (Livingston and Miller 2000; Peng and Brucato 2004; Daniels and Vijayakumar 2007). I expect issuers that hire a non-top-tier underwriter to face higher uncertainty compared to issuers that hire a top-tier underwriter. In sum, my argument on the negative relation between accruals quality and split bond ratings, depicted in *H1*, will be exacerbated among firms with higher information asymmetry.

Second, prior studies provide empirical evidence that strong corporate governance lead to lower cost of debt capital and higher credit ratings (Anderson et al. 2004; Ashbaugh-Skaife et al. 2006). Thus, I expect that the negative effect of poor accruals quality to be pronounced among firms with poor corporate governance (e.g., small board size, less independent board, audit committee members with less expertise).

Finally, several studies document risk-sharing or co-insurance effects prevalent among business groups. With respect to debt financing, business groups enable member firms to share risks by smoothing out income flows and reallocation resources (Ferris et al. 2003; Khanna and Yafeh, 2005, 2007). A recent study by Byun et al. (2013) document that firms affiliated with major Korean business groups (i.e., chaebols) show a substantially lower cost of public debt than do independent firms due to the co-insurance effect. Consistent with the co-insurance argument, I expect that the negative consequences of accruals quality on credit risks to be exacerbated for firms that are not affiliated with business groups because these firms cannot receive funding or be bailed out by business group affiliated firms.

Based on this discussion, my hypothesis has the following four components:

H2a: The negative effect of poor accruals quality on split bond rating is exacerbated among firms with high information asymmetry.

H2b: The negative effect of poor accruals quality on split bond rating is exacerbated among firms with weak corporate governance (e.g., small board size, less independent board, audit committee members with less expertise).

H2c: The negative effect of poor accruals quality on split bond rating is exacerbated for firms that are not affiliated with business group (i.e., chaebols).

III. Research Design

3.1 Measurement of Accruals Quality

To test my hypotheses, I draw upon the accounting literature to obtain more precise measures of information quality. The quality of a firm's accounting information is often estimated by a firm's accruals quality. Until recently, accruals quality was primarily measured in terms of discretionary accruals with the assumption that managers intentionally manipulate or manage accounting information. A variant of the Jones (1991) model, such as the modified Jones model (Dechow et al. 1995), or performance-matched discretionary accruals (Kothari et al. 2005) is employed to separate the portion of accruals most subject to managerial discretion.

More recently, some researchers in financial accounting question whether such methodology can reliably distinguish between earnings management in a changing operating or economic environment. Because both the intentional and unintentional effects can increase investor uncertainty, a measure that captures both of these effects is arguably preferable. The discretionary accruals approach is used based on the notion that managers exploit their discretion over accounting decisions to improve reported earnings. However, even in the absence of intentional earnings management, accounting information is affected

by volatility in a firm's fundamentals such as its operating environment as well as its industry- and firm specific-characteristics. To the extent investors differ in the ability to process this information, poor accruals quality creates more uncertainty for outside investors about a firm's true performance, regardless of whether it is created through earnings management or not (Lee and Masulis 2009). Further, Bhattacharya et al. (2013) report that the extent to which a firm's earnings (accruals) map into cash flows directly influences the magnitude of information asymmetry and that poor earnings quality is significantly associated with higher information asymmetry.

Adopting more recent financial accounting literature, I use several approaches to measure the accruals quality of the bond-issuing firms and these measures intend to capture the general quality of the issuer's accounting information rather than any discretionary reporting behavior that might occur shortly before going public. Following Dechow and Dichev (2002), my first measure of accruals quality is based on the standard errors of residuals from a model mapping yearly current accruals into operating cash flows in the prior, current, and subsequent years estimated in each of the past five years, where larger standard errors imply poorer quality accounting information. This model was modified by McNichols (2002) to control for changes in sales revenue and property, plant, and equipment (PPE) and is called the modified DD model (hereafter MDD), which I use as my second proxy of accounting information quality. In the MDD model, changes in sales revenue and PPE are added to model (5) because these components are important in forming expectations about current accruals, beyond their direct effects on operating cash flows. Ball and Shivakumar (2006) further develop a model that incorporates the asymmetry in gain and loss recognition (timelier loss recognition), the notion of conservatism, which I use as my third measure of accruals quality (hereafter BS

model). I use the composite index of the percentile rank values of the three measures as my primary measure of accruals quality (AQINDEX) in this study.

The quality of reported accruals, which I use to proxy for general accruals quality, is measured as the standard deviation of residuals from the following models:

$$TAC_{t-1} = b + b_1\, CFO_{t-2} + b_2\, CFO_{t-1} + b_3\, CFO_t + \varepsilon \qquad (1) - DD$$

$$ACC_{t-1} = b + b_1\, \Delta REV_{t-1} + b_2\, GPPE_{t-1} + b_3\, CFO_{t-2} + b_4\, CFO_{t-1} + b_5\, CFO_t + \varepsilon \qquad (2) - MDD$$

$$ACC_{t-1} = b + b_1\, \Delta REV_{t-1} + b_2\, GPPE_{t-1} + b_3\, CFO_{t-2} + b_4\, CFO_{t-1} + b_5\, CFO_t + b_6\, DCFO_{t-1} + b_7\, CFO_{t-1} * DCFO_{t-1} + \varepsilon \qquad (3) - BS$$

where *TAC* is net income less cash flow from operations plus depreciation expenses[38], *ACC* is net income less cash flow, *CFO* is cash from operations, *REV* is sales revenue, and *GPPE* is gross property, plant, and equipment, each of which is deflated by lagged total assets. *DCFO* is an indicator variable that equals 1 if *CFO* is negative, and 0 otherwise. CFO_t is the most recent fiscal year ending prior to year the firm issues a bond.[39]

Each of the model is estimated separately for each industry group based on

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[38] Consistent with Givoly and Hayn (2000), I use accruals before depreciation to capture working capital accruals such as changes in current assets and current liabilities in the DD model. However, I do not adjust for depreciation expenses in capturing total accruals in the MDD and BS models because gross property, plant, and equipment is included as the explanatory variable, thus incorporating working capital accruals arising from Capex.

[39] I allow for 3-month lag after the fiscal year-end for the financial reports to be released and used by the credit rating agencies. For example, for a December-year-end company, if the company issued a corporate bond in January of 2005, the most recent financial statements available are those with fiscal year ending 2003. This requirement is to ensure that the time period that the accounting information is publicly available is properly matched with the time the issuing firms are evaluated by credit rating agencies. Additionally, I use *CFO* at time t, rather than *CFO* at time t+1 in models (1) through (3) to ensure that underwriters had access to all information required in estimating AQ at the time of bond valuation. Changing the models to capture *CFO* at time t+1 does not alter the results although the statistical significance of the test becomes weaker. For instance, when using *Split* and *Split Level* as the dependent variable, the coefficient on *AQINDEX* is 0.098 and 0.115 with *t-values* of 1.81 and 1.85, respectively, both of which are significant at the 10% level.

the 2-digit SIC code having at least 10 firms in a given year. The industry-specific cross-sectional regressions in a given year generate firm-specific residual for that year. The standard deviation of the residuals is calculated over years *t*-4 through *t* in which I require a minimum of three years of data out of the five years. Each of the residuals calculated for models (1) through (3) are ranked between 0 and 1, and I compute the average of the three to obtain the composite index, *AQINDEX*, as my primary measure of accruals quality. Larger standard deviations of residuals reflect a greater portion of accruals left unexplained by the model, indicating poorer accruals quality.

While the DD, MDD, and BS models are a popular approach for estimating accruals quality in financial accounting studies, I recognize that they have some limitations. It contains measurement errors due to the omission of other firm-level characteristics that affect accruals; the estimation assumes that the firm level parameters remain constant over time (Dechow et al. 2010). I address this concern by using an accruals model that incorporates firm fixed effects and I further discuss this issue in the robustness test Section 6.

3.2 Models of Accruals Quality and Split Bond Rating

I use bond-level rather than firm-level ratings to identify disagreement about credit risk because the three rating agencies in Korea, KIS, NICE, and KR, rarely initiate simultaneous changes in firm or instrument-level credit ratings. This lack of simultaneity makes it difficult to determine whether a split rating occurs due to asynchronous ratings changes or due to uncertainty about credit risk. Therefore, the initial rating of a bond issue provides a natural time to examine disagreement about credit risk among agencies because they make a simultaneous judgment at that point. Furthermore, firm-level ratings from the three rating agencies may not be issued concurrently, while multiple agencies assign a rating to the bonds at issuance upon request by the issuer within

reasonably concurrent time periods.

[Insert Figure 1 in here]

To identify split ratings, I first convert the letter ratings of KIS, NICE, and KR to a single numeric scale, with better letter ratings corresponding to lower numbers: AAA=1, AA+= 2,…D=20. I use an indicator variable, *Split* (0,1), to measure the likelihood of rating disagreement among the three rating agencies. To understand the characteristics of the split-rated sample, I have depicted the relation between average bond rating and the probability of receiving a split rating in Figure 1. It shows that bonds that have poor bond rating have a higher likelihood of receiving a split rating across agencies. I also use an ordinal variable, *Split Level*, to measure the magnitude of the disagreement among the rating agencies. In additional analyses, I replace Split-related variables with credit spread and average bond ratings. *Bond Spread* captures the difference in yield to maturity (YTM) between a corporate bond and the Treasury bond with similar maturity.[40] *Rating_avg* is defined as the average of bond ratings received by any of the three rating agencies as additional proxy for credit risk.

I use fourteen different control variables taken from the prior literature that are related to credit risk, firm-characteristics, and accruals quality. The bond-specific variables are: (1) *Maturity* - the natural log of the bond's time to maturity in days, following Morgan (2002). The expected coefficient is uncertain because while it initially seems evident that greater uncertainty would be associated with longer maturity debt, prior research has shown that for high-yield debt instruments, longer maturities are actually associated with lower, not higher, yields (Langohr and Langohr 2009), consistent with longer debt

[40] I use the bond spreads of corporate bonds on the issuance date. The bond spread on a bond issue represents the expected premium that a firm must pay to raise funds in the bond market and is a direct measure of that firm's incremental cost of debt capital (Sengupta 1998; Shi 2003; Mansi et al. 2004; Jiang 2008).

maturity signaling a good firm; (2) *Face Value* - The natural log of the par value of the bond issue, following Morgan (2002). The variables that are related to firm-characteristics and accruals quality are (3) *Leverage* - sum of long-term debts and short-term debts divided by total assets; (4) *Interest Coverage* - operating income divided by interest expense; (5) *б(ROA)* - the standard deviation of *Return on Assets* over years t-4 through t in which I require a minimum of three years of data out of the five years; (6) *Size* - the natural log of total assets; (7) *ROA* - net income divided by total assets; (8) *Investment Grade* - indicator variable that takes on the value 1 if the average bond rating is BBB+ or above, and 0 otherwise; (9) *Age* - the natural log of the age of the firm, measured as the number of years passed since a firm's establishment date; (10) *Listed* - indicator variable that takes on the value 1 if the firm is listed, and 0 otherwise; (11) *Public Offering* - indicator variable that takes on the value 1 if the bond is issued through public offering, and 0 if the bond is privately placed; (12) *Loss* - indicator variable that takes on the value 1 if the firm reports a loss for the year, and 0 otherwise; (13) *Operating Cycle* - the natural log of the sum of days accounts receivable and days inventory; (14) *Owner* - ownership of largest shareholders and related parties; See Appendix B for more detailed variable definitions. I also include year and industry fixed effects in all regression models.

I follow Morgan (2002) in designing the empirical model by estimating the effect of accruals quality on credit risk as follows:

$$\begin{aligned} \textit{Split Rating} = {} & a + \alpha_0\, \textit{AQINDEX} + \alpha_1\, \textit{Maturity} + \alpha_2\, \textit{Face value} + \alpha_3\, \textit{Leverage} \\ & + \alpha_4\, \textit{Interest Coverage} + \alpha_5\, \textit{б(ROA)} + \alpha_6\, \textit{Size} + \alpha_7\, \textit{ROA} \\ & + \alpha_8\, \textit{Investment Grade} + \alpha_9\, \textit{Age} + \alpha_{10}\, \textit{Listed} \\ & + \alpha_{11}\, \textit{Public Offering} + \alpha_{12}\, \textit{Loss} + \alpha_{13}\, \textit{Operating Cycle} \\ & + \alpha_{14}\, \textit{Owner} + \text{year and industry fixed effects} \end{aligned}$$

$$+ \varepsilon \qquad (4)$$

where *Split Rating* is one of *Split* or *Split Level*, and all other variables are as previously defined.

IV. Sample Construction and Descriptive Statistics

4.1 Sample Construction

I collect data on the domestic public bonds and financial data from FnGuide DataPro over 2000 to 2010.[41] I exclude bonds with option provisions and those with maturity of less than 365 days at the issuance date. The initial sample consists of 6,242 unsecured bonds. I exclude issues with a rating date difference greater than 30 days. Next I match each bonds issued with accruals quality measure, as shown in Table 1, after excluding issues with missing values of accruals quality measure, 3,508 observations remain. The requirement for the *Split* variable reduces the number of observations to 2,595. I also exclude 116 observations with missing data for the control variables and 11 observations for non-December year-end firms. The final sample consists of 2,468 observations for corporate bonds issued in Korea from 232 issuers.[42]

[Insert Table 1 in here]

4.2 Descriptive Statistics

Table 1, Panel B and C reports the distribution of bond ratings received by NICE and distribution of split bond ratings. The percentage of split rating is approximately 5% of the total sample, 115 observations out of a total of 2,468 observations, a proportion that is smaller than that in the U.S.[43] Table 2

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[41] I use unconsolidated financial statements, which were the primary financial statements in Korea before IFRS was adopted in 2011.

[42] The main tests of this paper include firms that issued multiple issues in a given year. As a sensitivity analyses, I include only the issue with the longest maturity in a given year and results remain the same.

[43] Kim et al. (2013) on split ratings shows that split ratings occur for 65% (53%) of bonds rated

presents descriptive statistics for the sample. The mean (median) *AQINDEX* is 0.382 (0.343). The indicator variable, *Split*, has a mean value of 0.047, which indicates that 4.7% of the sample firms receive a split rating. The average value of *Bond Spread* is 1.489 while the mean of *Rating_avg* is 6.423, which is close to the bond rating of A. The mean of *Leverage* is 0.262, and the average return on assets (*ROA*) is 2.4%.

[Insert Table 2 in here]

Table 3 presents the Pearson correlation coefficients. I find that the measures of credit risk, *Split*, *Split Level*, *Bond Spread*, and *Rating_avg* are all significantly positively correlated. Poor accruals quality, as proxied by high values of AQINDEX, is positively correlated with *Split*, indicating that poor accruals quality is associated with higher frequency of split bond rating. Such relation holds in all three individual measures of AQINDEX, which are DD, MDD, and BS.

[Insert Table 3 in here]

Table 4 Panel A offers preliminary evidence that accruals quality influences credit risk of a firm in the predicted direction. Panel A groups the sample firms into accruals quality quartiles based on their average annual AQINDEX for the sample period. Bonds with the highest accruals quality are in the lowest AQ quartile and those with the lowest accruals quartile are in the highest AQ quartile. Average values of all four measures, *Split*, *Split Level*, *Bond Spread*, and *Rating_avg* decrease with accruals quality, a prediction consistent with my hypothesis. Additionally, the difference in the lowest AQ quartile and highest AQ quartile is significant at the 1% level for all variables related to credit risk. For example, across AQ quartiles, the average *Split* is almost 263.1 percent (or

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by at least two of the top three agencies (the top two agencies), a finding consistent with prior literature (Akins 2012; Cheng 2012; Livingston et al. 2007; Morgan 2002; Cantor and Packer 1997).

5 percentage points) higher in the lowest accruals quartile compared to the highest quartile. Panel B graphically illustrates the relation between split ratings and AQ quartiles. Since there exist many differences in the rating process in the bonds issued, I test for the link between accruals quality and credit risk while holding constant bond and firm-specific characteristics in the next section.

[Insert Table 4 in here]

V. Empirical Results

This section discusses the empirical results. I base inferences from all regressions on standard errors corrected for clustering the firm level. All regressions in this paper include industry indicator variables using a one-digit standard industry classification code and listing year indicator variables to control for year and industry fixed effects. Furthermore, to alleviate the effect of outliers, I winsorize the top and bottom 1% of all of the continuous variables in each year.

I use Eq. (4) to test the relation between accruals quality and split bond ratings (*H1*), and report the results in Table 5. Columns (1) and (2) report the OLS results of estimating Eq. (4), using *Split* and *Split Level* as the dependent variable, respectively. The coefficients on *AQINDEX* are significantly positive in all columns of the table at the 5% level, consistent with *H1*. Using the results of the regression for column (1), a one-standard-deviation increase in *AQINDEX* (i.e., poor accruals quality) is associated with an increase in the probability of a split rating of 0.032 (=0.131 * 0.247), a 3.2% increase. In column (2), a one-standard-deviation increase in *AQINDEX* (i.e., poor accruals quality) is associated with an increase in the *Split Level* of 0.036 (=0.144 * 0.247), a 3.6 % increase in the average 1.00 notch magnitude of split ratings.

The coefficients on a number of the control variables are significant and are

generally consistent with the prior research on the bond market. I find that firms with higher leverage, speculative grade, unlisted status, that issued bonds through private placement, and longer operating cycle to have higher split bond ratings. Overall, the results in Table 5 are consistent with *H1*, that poor accruals quality adversely affects information precision, which increases the frequency and magnitude of split bond ratings.

[Insert Table 5 in here]

To further examine the association between the composite index of accruals quality (*AQINDEX*) and split bond ratings, in Table 6, I run regressions of *Split* on individual measures of accruals quality, which are the DD, MDD, and BS models. In columns (1) to (3), I estimate regressions with the individual accrual quality measure separately. To the extent that accrual quality is related to information uncertainty, I expect poorer accruals quality (e.g., higher values of AQINDEX) to be associated with higher split bond rating. The results from columns (1)-(3) provide support for my hypothesis. Each of the accruals quality measures shows a positive and significant coefficient at the 5% level. It ranges from 0.767 to 0.937, suggesting that the probability of split increases by between 3.8% and 4.7% when the individual accruals quality measure deteriorates by one standard deviation. Consistent with the argument that poor accounting information increases information asymmetry between the issuer and credit rating agencies, I find the frequency of split rating to be inversely related to the quality of accounting information.

[Insert Table 6 in here]

Because *Split* is a binary variable and *Split Level* is an ordinal variable, I report the logit and ordered logit estimations in column (1) and (2) of Table 7, respectively. In theory, if the error term in an equation with a latent continuous dependent variable is normally distributed, then logit estimation is more

appropriate. However, logit estimates are inconsistent if this error term is not normal, and OLS estimates may be more robust to this and other model specification issues. The results are similar in the logit estimation approach in that as accruals quality deteriorates (i.e., higher *AQINDEX*), the frequency and magnitude of split ratings increases.

In addition, I report the average marginal effect which is computed as the sample average of all individual marginal effects. For column (1) which reports the results of the logit regression model using *Split* as the dependent variable, an increase from 0 to 1 in AQINDEX is associated with 11.0% increased probability of receiving a split bond rating, all else constant. Likewise, column (2) reveals that an increase from 0 to 1 in AQINDEX is associated with 9.8% increased probability of receiving a split bond rating, all else constant.

[Insert Table 7 in here]

VI. Additional Analyses

This section provides various types of additional analyses. First, it examines whether the results are affected by downgrades or upgrades. Second, this section examines the effect of information asymmetry and corporate governance, on the relation between accruals quality and split bond ratings. Also, it takes into account the non-linear characteristics of accruals quality and addresses concerns on potential correlated omitted variables problems by examining ratings that experienced deteriorating accruals quality, using a Heckman approach, and several interaction tests. Finally, I use alternative definition of credit risks and control for other variables that could potentially cause correlated omitted variable problems.

6.1 The effect of downgrades and upgrades

To address the concern that the results are driven by ratings that experience

ratings downgrade, I examine whether downgrades or bond ratings that receive a rating that changes its status from investment to non-investment grade affect the results. I construct four variables to identify cases in which rating changes occur: *Downgrade* (Indicator variable that takes on the value 1 if a firm experiences a rating downgrade, and 0 otherwise), *Inv_Noninv* (Indicator variable that takes on the value 1 if a firm experiences a rating downgrade that results in changing the status from investment to non-investment grade, and 0 otherwise), *Upgrade* (Indicator variable that takes on the value 1 if a firm experiences a rating upgrade, and 0 otherwise), and *Noninv_Inv* (Indicator variable that takes on the value 1 if a firm experiences a rating downgrade that results in changing the status from non-investment to investment grade, and 0 otherwise).

In Table 8, I include each of the variables that capture the change in status of the rating as an additional control variable. Columns (1) through (4) show results after controlling for *Downgrade*, *Inv_Noninv*, *Upgrade*, and *Noninv_Inv*, respectively. Results for all four specifications remain significant at the 5% level. Column (5) investigates whether the results remain intact after excluding downgrades. The coefficient on *AQINDEX* is positive and significant (0.113) at the 5% level (*t-stat* = 2.01). Additionally, I conduct a sub-sample analysis, focusing on bonds that experience ratings upgrade. I expect the negative effect of accruals quality on *Split* to be weak for upgrades due to its enhanced status. The number of observations for upgrades reduces to 71 and the correlation coefficient between AQINDEX and *Split* for the sample of upgrades is 0.253 (*p-value* = 0.033) which is quite high. As shown in column (6), while the coefficient on AQINDEX is insignificantly positive (0.263) due to the small sample size, it is directionally consistent with my hypothesis and still has moderate significance (*p-value* = 0.15) even for a sample consisting of only

upgrades. Thus, it suggests that the results are not driven by firms that experience a rating downgrade.

[Insert Table 8 in here]

6.2 The effect of information asymmetry (*H2a*)

To examine the effect of the level of information asymmetry between issuers and credit rating agencies, I include the interaction between *AQINDEX* and five variables related to information asymmetry: 1) standard deviation of bond ratings, 2) whether or not the issuer is delisted, 3) standard deviation of return on assets, 4) whether or not the bond is privately placed, and 5) low-quality underwriter.

Volatility of bond ratings and delisted status measure how close the firm is to default while volatility of return on assets represents higher information risk (Francis et al. 2005; Yu 2005; Bharath et al. 2008). Given the role of information uncertainty on split ratings, I predict significantly positive coefficients on the interactions because the severe uncertainty about the future payoffs of debt holders make monitoring difficult and aggravates problems caused by poor accruals quality.

For volatility of bond ratings, I define a variable, б(*Bond Rating*), to be the standard deviation of *Bond Rating* for a given bond. For delisted status, I define an indicator variable, *Delisted*, that takes on the value 1 if the firm is delisted, and 0 otherwise. For volatility of performance, I use a variable б(*ROA*), which is the standard deviation of *Return on Assets* over years t-4 through t in which I require a minimum of three years of data out of the five years. To capture poor information environment, I use an indicator variable for bonds issued through private placement. Additionally, firms that hire a top underwriter in issuing bonds, will benefit from the rating processes due to reputation effect of the underwriter. To measure low-quality underwriter, I use an indicator variable for

firms that hired non-top underwriter.

I then add the interaction terms to the model and find that the interactions are all significantly positive, as reported in columns (1)-(5) of Table 9. The results suggest that poor accruals quality significantly increases the frequency of split bond ratings for firms with higher information asymmetry, consistent with my prediction in *H2a*. The results Table 9 remain almost the same when *Split Level* is used as the dependent variable.

[Insert Table 9 in here]

6.3 The effect of corporate governance and business group affiliation (*H2b* and *H2c*)

A line of literature emphasizes the role of corporate governance in reducing cost of debt capital. For instance, Anderson et al. (2004) document that the cost of debt is inversely related to high quality corporate governance structure such as board independence, board size, audit committee size, independent audit committees, and meeting frequency. Similarly, Ashbaugh-Skaife et al. (2006) suggest that firms with strong corporate governance benefit from higher credit ratings relative to firms with weaker governance. To the extent that strong corporate governance affects the credit ratings and cost of debts, it is possible governance structure is a correlated omitted variable in my models. Further, given the link between governance and cost of debt, it is possible that the negative effect of poor accruals quality is exacerbated by weak corporate governance. To examine these two possibilities, I use the hand-collected data on corporate governance variables from 2003 to 2008 from annual reports. The sample size is reduced to 1,014 for the sample period 2003-2008 due to the availability of the corporate governance variables.

Table 10, Panel A reports the results on the effect of corporate governance on the association between accruals quality and credit risk. Columns (1)-(6)

include various corporate governance variables as an additional explanatory variable in Eq. (4). There are ten variables related to corporate governance which are, number of directors on the board (*Board*), number of independent outside directors on the board (*Board Out*), number of members on the audit committee (*AuditCom*), number of independent outside members on the audit committee (*AuditCom Out*), number of audit committee members with accounting expertise (*AccExpertise*), number of audit committee members with financial expertise (*FinExpertise*), an indicator variable on whether the audit committee members have financial or accounting expertise (*Expertise*), number of meetings held by the audit committee (*Meeting*), an indicator variable for firms that voluntarily establish the audit committee (*Volun AuditCom*) and ownership of largest shareholders and related parties (*Owner*). Because some of these governance variables are highly correlated, I use principal component analysis (PCA) to classify the original variables into multiple aspects of governance quality of a firm and obtain 5 factor scores that would be used in the regression analyses.[44]

In Table 10 Panel A, columns (1)-(3) include these five factors while models (4)-(6) include all of the ten corporate governance variables.[45] The results show that the coefficient on *AQINDEX* is positive and statistically significant across all columns of the table at the 5% and 10% levels, demonstrating the robustness of the results to the effect of corporate governance. Many of the corporate governance variables, such as *Board* or *Volun AuditCom*,

[44] I use the scree test in order to determine the number of factors to retain. In the scree test, the eigenvalues associated with each component are plotted and breaks between the components with relatively large eigenvalues and those with small eigenvalues are identified. The components that appear before the break are assumed to be meaningful and are retained. This procedure results in five factors.

[45] The requirement for all ten of the corporate governance variables in obtaining the factors reduces the number of observations to 706 for the period 2003-2006 in Table 9, Panel A.

shows a significant negative coefficient, suggesting that good governance leads to lower frequency of split rating or bond spread, consistent findings from prior research.

Further, I conduct subsample analyses using three aspects of corporate governance, which are board characteristics, audit committee characteristics, and Chaebol affiliation, to measure the quality of corporate governance structure of a firm. I classify firms as having strong (weak) governance if they have large (small) board size, large (small) number of independent board members, high (low) expertise of the audit committee, and voluntarily established audit committee (or not). I partition the sample into weak corporate governance firms and strong corporate governance firms and estimate the model in Eq. (4) without the *Owner* variable for each of the partitioned samples. I predict that the negative effect of poor accruals quality on split bond rating is exacerbated among firms with weak corporate governance (*H2b*).

Prior literature is mixed on the effect of group affiliation (i.e., Chaebol) on cost of debt. The expropriation argument states that a substantial divergence between control and ownerships (La Porta et al. 1999; Claessens et al. 2000) provide incentives for business-group affiliated firms to expropriate wealth at the expense of minority shareholders, and thus result in higher cost of capital. However, this argument mostly applies to the equity market. When it comes to the debt market, the co-insurance or risk-sharing argument appear to better explain why Chaebols enjoy the lower cost of debt (Byun et al. 2013). Consistent with this view, I predict that the negative effect of poor accruals quality to be aggravated among firms that do not have any affiliation with business group.

In Table 10 Panel B, columns (1) through (5), show the results of sub-sample analyses classified based on board size, board independence, expertise

of the audit committee, whether or not a firm voluntarily establishes the audit committee, and whether or not a firm is affiliated with business groups. The coefficients on *AQINDEX* are overall positively significant only in firms with low level of corporate governance. For example, in Column (1), the coefficient on *AQINDEX* for 'Low' group is 0.379 (*t-value* = 2.79) while that for 'High' group is -0.132 (*t-value* = -1.24). The difference in coefficients for the sub-sample based on *D_Board* is 0.511 (= 0.379 + 0.132) and significant with *p-value* of 0.003 in a two-tailed test. Similarly, the difference in coefficients for the sub-sample based on *Volun AuditCom* is 0.292 (= 0.248 + 0.044) and significant with *p-value* of 0.049.[46] It reveals that the negative relation between accruals quality and split ratings is particularly strong among firms with poor governance mechanism.

Column (2) shows that the coefficient on *AQINDEX* in 'Low' group (i.e., low proportion of independent members on the board) is 0.303 (*t-value* = 2.13) while that on 'High' is 0.084 (*t-value* = 1.16). Columns (3) and (4) show that the adverse effect of poor accruals quality on split ratings is prevalent among firms with audit committee members who have low accounting or financial expertise (*t-value* = 1.95) and among firms that do not voluntarily establish the audit committee (*t-value* = 1.85). These results signify that the negative effect of poor accruals quality on split bond rating is exacerbated among firms with weak corporate governance, consistent with *H2b*.[47] Column (5) shows that the

[46] I find that the differences in coefficients for sub-samples based on other corporate governance measures are consistent with the hypothesized direction, but that the level of significance of the difference is lower.

[47] Given that prior studies establish an empirical link between corporate governance and credit risk (e.g., cost of debt capital, credit ratings) (Anderson et al. 2004; Ashbaugh-Skaife et al. 2006), I further investigate whether board and audit committee characteristics are correlated. I find that Split is significantly negatively correlated with *Board*, *AuditCom*, *AuditCom Out*, *AccExpertise*, *Meeting*, and *Owner* at less than the 1% level and with *Volun AuditCom* at the 5% level, consistent with prior literature.

coefficient on *AQINDEX* in 'No' affiliation with business group is 0.440 (*t-value* = 2.52) while that on 'Yes' is 0.115 (*t-value* = 1.48). The difference in coefficients for the sub-sample based on *Chaebol* is 0.325 (= 0.440 - 0.115) and significant with *p*-value of 0.081 in a two-tailed test. This supports the co-insurance argument that predicts *Chaebol*-affiliated firms will enjoy protection from their member firms in times of difficulties. I find evidence consistent with negative consequences of having poor accruals quality are aggravated among firms with no affiliation with *Chaebol* (*H2c*). The results in Table 10 remain the same when *Split Level* is used as the dependent variable.

[Insert Table 10 in here]

Another concern regarding this test is that it is not free from causal arguments or does not provide direct evidence of weak corporate governance through poor information quality. Existing literature on the link between governance mechanisms and accounting information quality generally shows that strong corporate governance leads to enhanced financial reporting practices. For example, studies document that more independent boards and higher audit committee quality are associated with less earnings management (e.g., Beasley 1996; Klein 2002; Abbott et al. 2004; Krishnan 2005; Vafeas 2005; Farber 2005).[48]

Consistent with findings from prior literature, I find preliminary evidence which shows that strong set of corporate governance enhances accruals quality. The correlation analyses show that increases in *Board*, *Board Out*, AuditCom, *AuditCom Out*, *AccExpertise*, *Meeting*, and *Owner* are significantly associated with higher accruals quality at the 5% level. Thus, it serves as partial evidence that the negative consequences of accruals quality can be mitigated among

[48] In contrast, Larcker et al. (2007) find mixed evidence of associations between fourteen governance factors and earnings quality as measured by discretionary accruals and restatements.

firms with good corporate governance due to the positive effect governance has on accruals quality.[49]

6.4 Endogeneity

It is possible that accruals quality can be an endogenous variable in the sense that certain firm characteristics that affect accruals quality might also affect the consequences of poor quality such as credit risks of a firm. For example, firm size may affect both accruals quality and split ratings and thus bias the regression estimates in the absence of proper controls. To alleviate the concern, I several approaches to provide comfort that the results are not driven by endogeneity.

First, the regression models include a wide range of firm- and bond-specific controls that should capture many of the factors that affect the likelihood of a firm receiving a split rating. For example, good credit quality, the amount of leverage, and profitability can be captured by control variables such as *Investment Grade*, *Leverage*, and *Size*. The main analyses also use industry and year fixed effects, which should control for industry and time period factors.

Second, several interaction tests help alleviate the concern over endogeneity (Lin et al., 2012, p. 3). In Tables 9 and 10, I examine the interactive effects of information asymmetry, weak corporate governance, and group affiliation on the relation between accruals quality and split bond ratings. All results are consistent with my predictions, suggesting that endogenous nature of the variable accruals quality is not driving the results. Third, following Lin et al. (2012, p. 10), I include industry×year fixed effects to capture the time-

[49] The number of observations used for models (1), (2), (4), (5) is 1,014 while the lack of observations for audit committee expertise reduces the number of observations for model (3) to 706 for the period 2003-2006.

varying industry characteristics that could drive both the determination of accruals quality and credit risks. When I add industry×year fixed effects to my models I find that the results do not change (untabulated).

Fourth, I examine whether firms that have experienced deteriorating accruals quality show an increase in the frequency of split ratings. I identify 1,666 cases in which the bond issued experienced a decrease in accruals quality compared to prior year during the sample period. In Table 11, columns (1) through (4) use *AQINDEX_CH*, *DD_CH*, *MDD_CH*, and *BS_CH*, respectively. *DD_CH*, *MDD_CH*, and *BS_CH* captures the change in the percentile rank values of residuals estimated from the DD (Dechow and Dichev (2002)), MDD (Modified Dechow and Dichev (2002)), and BS (Ball and Shivakumar (2006)) models, respectively. *AQINDEX_CH* is the average of *DD_CH*, *MDD_CH*, and *BS_CH*. The analysis focuses on issuers with deteriorating accruals quality measures in which any of *DD_CH*, *MDD_CH*, and *BS_CH* increased from prior year. The sample is composed of 1,666 observations for public bonds during 2000–2010. I find that across columns (1) to (4) the coefficients on *AQINDEX* are significantly positive at the 5% level, consistent with reported findings of this paper.[50]

[Insert Table 11 in here]

Finally, given that the estimation process for split bond ratings require firms to receive more than one bond rating, the results on split bond rating could be driven by this nonrandom selection criterion. The non-selected sample consists of 3,508 observations during the period 2000 through 2010, which is reduced to 2,468 observations after imposing data restrictions on split bond rating and control variables. Therefore, the process systematically excludes firms that received a single rating. To avoid potential selection bias, I employ

[50] The results in Table 10 remain the same when *Split Level* is used as the dependent variable.

the Heckman (1979) selection model to test and correct for any significant selection bias.

Table 12 presents estimates from a Heckman selection model to examine the effect of accruals quality on split bond ratings. Lennox et al. (2012) suggest that an absence of "exclusion requirements" in the first stage can lead to severe multicollinearity[51] in the second stage and that the z variable must be an important determinant of the choice variable (e.g., likelihood of obtaining more than one bond rating) in the first stage.[52] To meet this exclusion requirement, I include *Commercial Paper* (CP), an indicator variable that takes the value 1 if the firm has commercial paper outstanding as reported by FnGuide. Cantor and Packer (1997) suggest that this variable is positively related to the likelihood of obtaining additional bond ratings because regulations make managers extremely sensitive to CP ratings. Thus, a firm obtaining a CP rating is likely to obtain additional long-term bond rating as well. It follows that the instrument variable *Commercial Paper* is positively associated with *Coverage* (an indicator for when a bond receives a split rating) while it is not likely to be significantly related to accruals quality.

Table 12, Panel A exhibits the results of the first-stage regression in which I

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[51] I check for multicollinearity and find that the highest VIF score is 7.38 (for the inverse Mill's ratio) and 6.21 (for *Size*), which are both less than the cutoff point of 10.

[52] The first-stage regression model in the Heckman selection model is as follows:

$$\begin{aligned} Coverage = a &+ \alpha_0\, AQINDEX + \alpha_1\, Maturity + \alpha_2\, Face\ value + \alpha_3\, Leverage \\ &+ \alpha_4\, Interest\ Coverage + \alpha_5\, \sigma(ROA) + \alpha_6\, Size + \alpha_7\, ROA + \alpha_8\, Age + \alpha_9\, Listed \\ &+ \alpha_{10}\, Loss + \alpha_{11}\, Operating\ Cycle + \alpha_{12}\, Owner + \alpha_{13}\, Commercial\ Paper \\ &+ \text{year and industry fixed effects} + \varepsilon, \end{aligned}$$

where Coverage is an indicator variable that takes on the value 1 if the issued bond received split bond ratings, and 0 otherwise; *Commercial Paper* is an indicator variable that takes on the value 1 if the firm received a rating on its commercial paper, and 0 otherwise, which serves as an instrument variable in the first stage; the definition of the remaining variables is provided in Appendix B. I drop the control variable Investment Grade because the variable is no longer attainable with the expanded dataset, and also drop the control variable Public Offering because this variable results in too high VIF score, exceeding the cutoff point of 10.

include *Commercial Paper* in addition to the twelve control variables in the second stage. Examining the results, I find *Commercial Paper* to be positively and significantly associated with the likelihood of receiving a split rating, consistent with predictions from prior literature. Table 12, Panel B reports the results of the second-stage regressions[53], the average coefficients and their corresponding *z-statistics* with the inverse Mill's ratio included. The significant coefficient on the inverse Mill's ratio indicate that self-selection likely affects split rating after controlling for accruals quality and other determinants of split rating. I find that poorer accruals quality is associated with higher frequency of receiving a split rating, consistent with my hypothesis, and this result is robust to adjusting for sample selection bias.

Taken together, the several analyses described above consistently suggest that endogeneity is not the primary driver of my results.[54]

[Insert Table 12 in here]

6.5 Additional measures of credit risk

To corroborate the main findings of this paper, I use alternative measures of credit risk that have been heavily used by prior literature. Specifically, I use *Bond Spread*, which is defined as the difference in yield to maturity (YTM) between a corporate bond and the Treasury bond with similar maturity, and *Rating_avg*, which is the average of all bond ratings received. In estimating *Bond Spread*, I use the bond spreads of corporate bonds on the issuance date.

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[53] The second-stage regression model that includes the Inverse Mill's ratio is as follows:

$$\begin{aligned} Split = a &+ \alpha_0\, AQINDEX + \alpha_1\, Maturity + \alpha_2\, Face\ value + \alpha_3\, Leverage \\ &+ \alpha_4\, Interest\ Coverage + \alpha_5\, \sigma(ROA) + \alpha_6\, Size + \alpha_7\, ROA + \alpha_8\, Investment\ Grade \\ &+ \alpha_9\, Age + \alpha_{10}\, Listed + \alpha_{11}\, Public\ Offering + \alpha_{12}\, Loss + \alpha_{13}\, Operating\ Cycle \\ &+ \alpha_{14}\, Owner + \alpha_{15}\, Inverse\ Mills\ Ratio + \text{year and industry fixed effects} + \varepsilon. \end{aligned}$$

where Inverse Mill's ratio is estimated from the first-stage regression model and all other variables are defined in Appendix B.

[54] The results in Table 12 remain the same when *Split Level* is used as the dependent variable.

The bond spread on a bond issue represents the expected premium that a firm must pay to raise funds in the bond market and is a direct measure of that firm's incremental cost of debt capital (Sengupta 1998; Shi 2003; Mansi et al. 2004; Jiang 2008; Byun et al. 2013). Further, I use *Rating_avg*, which is the average of bond ratings received by any of the three rating agencies as additional proxy for credit risk.

I make the following conjecture about whether better accounting information leads to lower pricing of credit risk (i.e., lower *Bond Spread*) in the bond market. In the theoretical and empirical literature, there are debates on whether and under what conditions information uncertainty and asymmetry are priced. In a theoretical world, higher disclosure quality increases the demand for securities and thus reduces the cost of capital (Diamond and Verrecchia 1991; Baiman and Verrecchia 1996). Similarly, Lambert et al. (2007) show that, holding firms' real decisions constant, reduced information uncertainty drives firms' costs of equity capital toward the risk-free rate, thereby generally reducing costs of equity capital. However, in a subsequent study, Lambert et al. (2012) suggest that information asymmetry does not affect the cost of capital for a given level of information precision in cases where competition is perfect.

Armstrong et al. (2011) empirically test whether differences in competition affect the level of information asymmetry. Using the number of investors as a proxy for competition, they find that information asymmetry is priced only when the degree of competition is low. In contrast, Doidge et al. (2004) find that firms that cross-list their shares in more stringent disclosure regimes have valuation premiums. In sum, these studies document mixed evidence on the effect of accounting information in security market. Despite the mixed findings, the focus of my study is the bond market in which the level of competition or liquidity is much lower than equity market (Hand et al. 1991, Dichev and

Piotroski 2001; Barth et al. 2008). Accordingly, I expect corporate bond investors to require lower credit spreads for firms with greater accruals quality.

Table 13 shows the results of using *Bond Spread* and *Rating_avg* as alterative proxies for credit risk. In addition to the same set of control variables in Eq. (4), I add the absolute value of discretionary accruals to show that the impact of *AQINDEX* is over and beyond the effect of discretionary accruals. In Table 13, column (1) shows that a one-standard-deviation increase in *AQINDEX* (i.e., poor accruals quality) is associated with an increase in the *Bond Spread* of 25 basis points (=1.006 * 0.247 * 100), a 16.9% increase in the average bond spread of 149 basis points. Results of column (2) indicate that a one-standard-deviation increase in *AQINDEX* (i.e., poor accruals quality) is associated with an increase in the *Rating_avg* of 0.541 (=2.192 * 0.247), consistent with poor accruals quality resulting in lower bond rating. The results further validate my hypothesis on the inverse relation between information uncertainty and credit risk.[55]

[Insert Table 13 in here]

6.6 Non-linear specification of accruals quality

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[55] The measures of discretionary accruals are obtained using the following procedures. I use the absolute value of two performance-adjusted measures suggested by Kothari et al. (2005). I use the following two steps to obtain the discretionary accruals measures:

1st step) First, discretionary accruals measure is estimated as the residuals of Kothari et al. (2005) model for each year and industry with 10 or more firms;

$$TAC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t - \Delta AR_t) + \beta_3 GPPE_t + \beta_4 ROA_t + \varepsilon,$$

in which *Asset* is defined as lagged total asset, ΔAR is defined as the change in accounts receivable deflated by lagged total assets and other variables are as defined in Appendix B.

Second discretionary accruals measure is estimated as the residuals of the modified Jones (1991) model for each year and industry with 10 or more firms;

$$TAC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t - \Delta AR_t) + \beta_3 GPPE_t + \varepsilon,$$

where all the variables are as defined as above. The second performance-matched discretionary accruals measure is obtained by taking the difference between the residual for each firm and the median unadjusted abnormal accruals for the *ROA* decile of the industry and year to which the firm belongs.

2nd step) I obtain absolute values of the two performance-adjusted discretionary accruals as described above.

Although my hypothesis predicts in inverse relation between information uncertainty and credit risk, the functional form of the mapping is not specified by theory. To allow for a non-linear relation between accruals quality and split bond rating, I replace the composite accruals quality index measure with the accruals quality quartile indicator variables (i.e., AQ1 to AQ4), where a larger value indicates poorer accruals quality.[56]

Table 14 reports the results of the regression of split ratings on accruals quality quartile indicator variables and other determinants of split ratings for the period 2000-2010. In this specification, the model intercept captures the accruals quality impact estimated for the benchmark portfolio with the lowest accruals quality (Quartile 1). The coefficients on each of the quartile indicator variables (i.e., *AQ2* to *AQ4*) represent the differences between each quartile's accruals quality effect and that of the benchmark portfolio, *AQ1*. Focusing on column (1), I find that, relative to quartile 1, each of the quartile indicator variables (i.e., *AQ2* to *AQ4*) shows a positive and significant coefficient, consistent with low accruals quality leading to higher frequency of split bond rating. Specifically, moving from *AQ2* to *AQ4*, the coefficients exhibit a monotonic increase in the frequency of split ratings (e.g., from 0.018 to 0.049), which suggests that as accruals quality deteriorates, the likelihood of receiving a split rating increases due to severe information uncertainty.

I find similar results across columns (2) to (4) in which the dependent variables employed are *Split Level*, *Bond Spread*, and *Rating_avg*, respectively.

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[56] The statistical model is as follows:

$$\begin{aligned}\text{Credit Risk} = {} & \alpha_0 + \alpha_1 \text{ AQ2} + \alpha_2 \text{ AQ3} + \alpha_3 \text{ AQ4} + \alpha_4 \text{ Maturity} + \alpha_5 \text{ Face value} \\ & + \alpha_6 \text{ Leverage} + \alpha_7 \text{ Interest Coverage} + \alpha_8\, \sigma(ROA) + \alpha_9 \text{ Size} + \alpha_{10} \text{ ROA} \\ & + \alpha_{11} \text{ Investment Grade} + \alpha_{12} \text{ Age} + \alpha_{13} \text{ Listed} + \alpha_{14} \text{ Public Offering} \\ & + \alpha_{15} \text{ Loss} + \alpha_{16} \text{ Operating Cycle} + \alpha_{17} \text{ Owner} \\ & + \text{year and industry fixed effects} + \varepsilon\end{aligned}$$

where AQ2 – AQ4 are the quartile indicator variables for AQINDEX and the other control variables are as defined previously.

Overall, the coefficients on quartile indicator variables exhibit a monotonic increase in credit risks as accruals quality is reduced. For instance, column (3) shows a general trend that as accruals quality deteriorates, *Bond Spread* increases (e.g., the coefficients on *AQ2*, *AQ3*, and *AQ4* are 0.058, 0.367, and 0.386, respectively). The evidence in this table supports the hypothesis that poor accruals quality is associated with higher frequency and magnitude of split ratings, larger bond spread, and worse bond rating in a non-linear specification as well.

[Insert Table 14 in here]

6.7 Alternative explanations

I acknowledge, however, that there could be potential alternative explanations for the relation between accruals quality and split ratings. Specifically, the association between accruals quality and split ratings could be attributable to the effects of investment (Wu et al. 2010), competition among rating agencies (Brown et al. 2011), average bond ratings (Morgan 2002), opacity (Morgan 2002; Livingston et al. 2007), innate factors of accruals quality (Francis et al. 2005), and non-linearity relation with ownership. I control for each of the factors and the results remain unchanged as shown in Table 15, confirming my main findings that poor accruals quality increases information uncertainty, therefore, lead to more disagreement on bond ratings among the three rating agencies. Although untabulated, I additionally control for the absolute value of discretionary accruals to show that the effect of accruals quality remains strong after controlling for the effect of discretionary accounting choices. I estimate two performance-matched discretionary accruals measure, |*DA1*| and |*DA2*|, following Kothari et al. (2005). [57] After controlling

[57] To measure the absolute value of performance-matched discretionary accruals that had been heavily used by prior studies, I use the following procedures. I use the absolute value of two

for |*DA1*| (|*DA2*|) in the regression model Eq. (4), I find that the coefficient on *AQINDEX* is 0.130 (0.128) and significantly positive at the 5% level with *t-value* of 2.07 (2.12), suggesting that the effect of accruals quality remains significant even after controlling for the effect of discretionary accounting choices. The results in Table 15 remain the same when *Split Level* is used as the dependent variable.

[Insert Table 15 in here]

6.8 Alternative accounting information quality proxies

I recognize that *AQINDEX* measure has some limitations. In particular, it contains measurement errors due to omission of firm-level characteristics. To address the above caveats of the DD model, I augment the DD model with firm fixed effects to obtain additional measure of accruals quality (hereafter FDD). The FDD model is equivalent to the DD model, except that firm fixed effects and year effects are added and estimated in a single panel regression framework. The advantages of the FDD model are such that the firm fixed effects can capture time-invariant firm characteristics, allowing it to distinguish between firms that have consistently large accruals model residuals of the same sign,

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performance-adjusted measures suggested by Kothari et al. (2005). I use the following two steps to measure *DA1* and *DA2*:

1st step) First performance-adjusted discretionary accruals measure, *DA1*, is estimated as the residuals of Kothari et al. (2005) model for each year and industry with 10 or more firms;

$$TAC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t - \Delta AR_t) + \beta_3 GPPE_t + \beta_4 ROA_t \ \varepsilon,$$

in which *Asset* is defined as lagged total asset, ΔAR is defined as the change in accounts receivable deflated by lagged total assets and other variables are as defined in Appendix B.

Second discretionary accruals measure is estimated as the residuals of the modified Jones (1991) model for each year and industry with 10 or more firms;

$$TAC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t - \Delta AR_t) + \beta_3 GPPE_t + \varepsilon,$$

where all the variables are as defined as above. The second performance-matched discretionary accruals measure, *DA2*, is obtained by taking the difference between the residual for each firm and the median unadjusted abnormal accruals for the *ROA* decile of the industry and year to which the firm belongs.

2nd step) I use the absolute values of the two performance-adjusted discretionary accruals measure, |DA1| and |DA2|.

from firms that have consistently low residuals. Also, inclusion of firm fixed effects can mitigate correlated omitted variable problems by capturing unobservable firm characteristics. Results show that although the significance level declines, the coefficient on *FDD* remain significant at the 10% level with *t-stat* = 1.84 (not tabulated).

VII. Conclusion

In this paper, I provide compelling evidence on the negative relation between accrual quality and the likelihood and magnitude of disagreement among three major credit rating agencies in Korea. While voluminous literature documents a link between information uncertainty and cost of capital in the equity market, not much attention has been given to the bond market despite its importance. This paper fills the void by establishing a strong link between accruals quality and split bond ratings.

To capture information uncertainty, I use a more precise measure of information uncertainty based on accounting information that captures not only the discretionary reporting choices made by the managers but also any estimation errors caused by a firm's fundamentals, such as its operating environment and industry conditions. Based on a sample of 2,468 observations for public corporate bonds over the period 2000-2010, I find that precise accounting information leads to lower frequency of split rating. This finding highlights that better accounting information lowers estimation risk of future cash flows and reduces information asymmetry among debt market participants, thereby leading to higher consensus on the firm's credit risk among rating agencies. These results remain significant after controlling for discretionary accruals (Kothari et al. 2004) and robust to the use of alternative measures of credit risk such as bond spread and average of bond ratings. I conduct a battery

of additional tests to confirm the findings of this paper. In summary, the results reported in this paper present persuasive evidence that poor accruals quality is a determinant of split ratings.

I acknowledge that the findings are subject to some limitations. First, it focuses on the public bond market and does not explicitly examine the other forms of debt financing due to data availability. Second, although I find consistent results with existing theory, it is possible that the generalizability of the findings to other countries' settings could be an issue as a result of unknown institutional differences. Subject to this caveat, the results inform standard-setters, regulators, academicians, and managers about the impact of accruals quality on credit risks in the bond market.

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APPENDIX A

Panel A: Long-term debt rating symbols used by credit rating agencies in the U.S. (Taken from Table 1 of Cantor and Packer 1997)

Interpretation	Moody's	DCR, Fitch, S&P
Investment-grade ratings		
Highest quality	Aaa	AAA
High quality	Aa1	AA+
	Aa2	AA
	Aa3	AA-
Strong payment capacity	A1	A+
	A2	A
	A3	A-
Adequate payment capacity	Baa1	BBB+
	Baa2	BBB
	Baa3	BBB-
Speculative-grade ratings		
Likely to fulfill obligations, ongoing uncertainty	Ba1	BB+
	Ba2	BB
	Ba3	BB-
High-risk obligations*		
	B1	B+
	B2	B
	B3	B-

*The agencies do not assign ratings to securities below this level of risk (very near or actually in default), however, they use different categorization systems that are difficult to compare.

Panel B: Debt rating symbols used by the major three credit rating agencies (KIS, NICE, and KR) in Korea (*in Korean*)

한국신용평가 (KIS)		NICE신용평가정보		한국기업평가(KR)	
AAA	원리금 지급능력이 최상급임.	AAA	원리금 지급확실성이 최고수준이며, 현단계에서 합리적으로 예측가능한 장래의 어떠한 환경변화에도 영향을 받지않을 만큼 안정적임.	AAA	원리금 지급확실성이 최고 수준이다.
AA	원리금 지급능력이 매우 우수하지만 AAA의 채권보다는 다소 열위임.	AA	원리금 지급확실성이 매우 높지만 AAA 등급에 비해 다소 열등한 요소가 있음.	AA	원리금 지급확실성이 매우 높지만, AAA등급에 비하여 다소 낮은 요소가 있다.
A	원리금 지급능력은 우수하지만 상위등급보다 경제여건 및 환경악화에 따른 영향을 받기 쉬운 면이 있음.	A	원리금 지급확실성이 높지만 장래 급격한 환경변화에 따라 다소 영향을 받을 가능성이 있음.	A	원리금 지급확실성이 높지만, 장래의 환경변화에 따라 다소의 영향을 받을 가능성이 있다.
BBB	원리금 지급능력이 양호하지만 상위등급에 비해서 경제여건 및 환경악화에 따라 장래 원리금의 지급능	BBB	원리금 지급확실성은 인정되지만 장래 환경변화로 전반적인 채무상환능력이 저하될 가능성이 있음.	BBB	원리금 지급확실성이 있지만, 장래의 환경변화에 따라 저하될 가능성이 내포되어 있다.

	력이 저하될 가능성을 내포하고 있음.				
BB	원리금 지급능력이 당장은 문제가 되지 않으나 장래 안전에 대해서는 단언할 수 없는 투기적인 요소를 내포하고 있음.	BB	원리금 지급 확실성에 당면 문제는 없지만 장래의 안정성면에서는 투기적 요소가 내포되어 있음.	BB	원리금 지급능력에 당면문제는 없으나, 장래의 안정성면에서는 투기적인 요소가 내포되어 있다.
B	원리금 지급능력이 결핍되어 투기적이며 불황시에 이자지급이 확실하지 않음.	B	원리금 지급 확실성이 부족하여 투기적이며, 장래의 안정성에 대해서는 현단계에서 단언할 수 없음.	B	원리금 지급능력이 부족하여 투기적이다.
CCC	원리금 지급에 관하여 현재에도 불안요소가 있으며 채무불이행의 위험이 커 매우 투기적임.	CCC	채무불이행이 발생할 가능성을 내포하고 있어 매우 투기적임.	CCC	원리금의 채무불이행이 발생할 위험요소가 내포되어 있다.
CC	상위등급에 비하여 불안요소가 더욱 큼.	CC	채무불이행이 발생할 가능성이 높아 상위등급에 비해 불안요소가 더욱 많음.	CC	원리금의 채무불이행이 발생할 가능성이 높다.
C	채무불이행의 위험성이 높고 원리금 상환능력이 없음.	C	채무불이행이 발생할 가능성이 극히 높고 현단계에서는 장래 회복될 가능성이 없을 것으로 판단됨.	C	원리금의 채무불이행이 발생할 가능성이 지극히 높다.
D	상환 불능상태임.	D	원금 또는 이자가 지급불능 상태에 있음.	D	현재 채무불이행 상태에 있다.

Panel C: Debt rating symbols used by the major three credit rating agencies (KIS, NICE, and KR) in Korea (*translated in English*)			
Interpretation	**KIS**	**NICE**	**KR**
Investment-grade ratings			
Highest quality	AAA	AAA	AAA
High quality	AA	AA	AA
High quality but subject to environmental factors	A	A	A
Strong payment capacity but subject to environmental factors	BBB	BBB	BBB
Speculative-grade ratings			
payment capacity	BB	BB	BB
Some payment capacity but subject to environmental factors	B	B	B
Likely to fulfill obligations, ongoing uncertainty	CCC	CCC	CCC
High-risk obligations and highly speculative	CC	CC	CC
Very near default	C	C	C
Default	D	D	D

In Panel B, the descriptions on the rating symbols and measures of default risks for rating agencies in Korea are obtained from respective company official website, which are http://www.nicerating.com/, http://www.korearatings.com/index.jsp, http://www.kisrating.com/.

APPENDIX B
Variable Definitions

Variables	Definition
Variables Used for Estimating Accruals Quality	
ACC	Net income less operating cash flows, deflated by lagged total assets
TAC	Net income less operating cash flows plus depreciation expenses, deflated by lagged total assets
CFO	Operating cash flows from the cash flow statement, deflated by lagged total assets
DCFO	Equal to 1 if *CFO* is negative, and 0 otherwise
ΔREV	Change in sales deflated by lagged total assets
GPPE	Gross property, plant, and equipment, deflated by lagged total assets
Accruals Quality Measures	
DD	The standard deviation of Eq. (5) residuals over years t-4 through t in which I require a minimum of three years of data out of the five years $TAC_{t-1} = \beta_0 + \beta_1 CFO_{t-2} + \beta_2 CFO_{t-1} + \beta_3 CFO_t + \varepsilon$, where all variables are as defined above
MDD	MDD model is equivalent to the DD model except that *ACC* is used as the dependent variable and ΔREV and *GPPE* are added. In other words, $ACC_{t-1} = \beta_0 + \beta_1 CFO_{t-2} + \beta_2 CFO_{t-1} + \beta_3 CFO_t + \beta_4 \Delta REV_{t-1} + \beta_5 GPPE_{t-1} + \varepsilon$, where all variables are as defined above
BS	BS model is equivalent to the MDD model except that $DCFO_{t-1}$ and the interaction term between $DCFOt_{-1}$ and CFO_{t-1} are included. In other words, $ACC_{t-1} = \beta_0 + \beta_1 CFO_{t-2} + \beta_2 CFO_{t-1} + \beta_3 CFO_t + \beta_4 \Delta REV_{t-1} + \beta_5 GPPE_{t-1} + \beta_6 DCFO_{t-1} + \beta_7 DCFO_{t-1} * CFO_{t-1} + \varepsilon$, where all variables are as defined above
AQINDEX	Average of the percentile rank values of residuals estimated from the three accruals quality models, which are DD, MDD, and BS models
Innate AQ	The predicted values from the following innate AQ regression model: $AQ = b_0 + b_1 SIZE + b_2 б(CFO) + b_3 б(Sales) + b_4 Oper\ Cycle + b_5 Neg\ Earn + \varepsilon$ where *AQ* represents an accruals quality measure based on the MDD model
Disc AQ	The residual value from the innate AQ regression model specified above

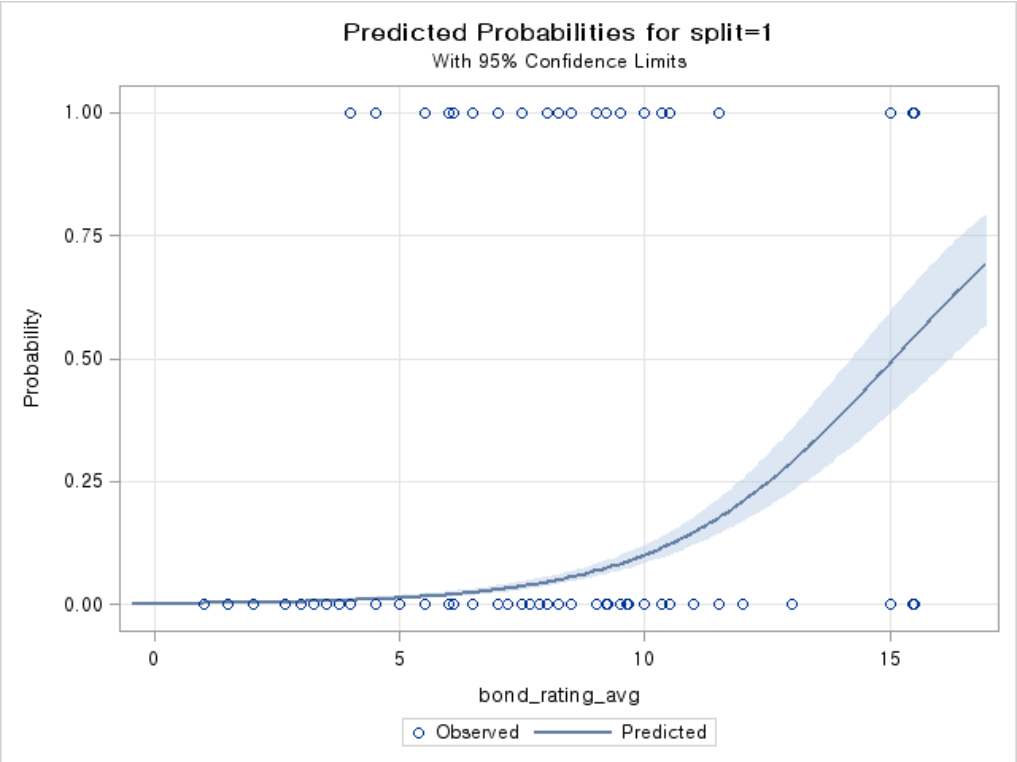
AQ2(3,4)	Indicator variable that takes on the value 1 for issuers in the Quartile 1 (2,3,4) of accruals quality index, and 0 otherwise. Quartile 1(4) is the group with best (worst) quartile of accruals quality
Dependent Variables	
Split	Indicator variable that takes on the value 1 if any of the three credit rating agencies, Korea Ratings (KR), NICE, and Korea Investors Service (KIS), report different ratings
Split Level	Ordinal variable that takes on the value 0, 1, and 2 when the ratings differ by 0, 1, and 2 or greater than 2 notches
Bond Spread	Difference in yield to maturity (YTM) between a corporate bond and the Treasury bond with similar maturity
Bond Rating	Bond ratings converted to numerical values between 1 (AAA) and 20 (D)
Rating_avg	Average of *Bond Rating* received by any of KR, NICE, and KIS credit rating agencies for a given bond
Control Variables	
Maturity	The natural log of the bond's time to maturity in days
Face Value	The natural log of the par value of the bond issue
Leverage	Sum of long-term debts and short-term debts divided by total assets
Interest Coverage	Operating income divided by interest expense
б(*ROA*)	The standard deviation of *Return on Assets* over years t-4 through t in which I require a minimum of three years of data out of the five years
Size	The natural log of total assets
ROA	Net income divided by total assets
Investment Grade	Indicator variable that takes on the value 1 if the average bond rating is BBB+ or above, and 0 otherwise
Age	The natural log of the age of the firm, measured as the number of years passed since a firm's establishment date
Listed	Indicator variable that takes on the value 1 if the firm is listed, and 0 otherwise
Public Offering	Indicator variable that takes on the value 1 if the bond is issued through public offering, and 0 if the bond is privately placed
Loss	Indicator variable that that takes on the value 1 if the firm reports a loss for the year, and 0 otherwise
Operating Cycle	The natural log of the sum of days accounts receivable and days inventory
Owner	Ownership of largest shareholders and related parties
Other Variables	

Downgrade	Indicator variable that takes on the value 1 if a firm experiences a rating downgrade, and 0 otherwise (based on rating information from KIS)
Inv_Noninv	Indicator variable that takes on the value 1 if a firm experiences a rating downgrade that results in changing the status from investment to non-investment grade, and 0 otherwise (based on rating information from KIS)
Upgrade	Indicator variable that takes on the value 1 if a firm experiences a rating upgrade, and 0 otherwise (based on rating information from KIS)
Noninv_inv	Indicator variable that takes on the value 1 if a firm experiences a rating downgrade that results in changing the status from non-investment to investment grade, and 0 otherwise (based on rating information from KIS)
Delisted	Indicator variable that takes on the value 1 if the firm is delisted, and 0 otherwise
б(*Bond Rating*)	The standard deviation of *Bond Rating* for a given bond
Private Placement	Indicator variable that takes on the value 1 if the bond is issued through private placement, and 0 if the bond is publicly placed
LowQual Underwriter	Indicator variable that takes on the value 1 for bonds issued with none of the top four underwriters which are Korea Development Bank, Kookmin, Woori, and Daewoo, and 0 otherwise
MTB	Market to book ratio, calculated as market value of equity divided by book value of equity
NewEq	The proportion of new shares issued
NumRaters	Number of credit rating agencies that rated the issue
R&D	Research and Development expenses divided by total assets
б(*CFO*)	The standard deviation of *CFO* over years t-4 through t in which I require a minimum of three years of data out of the five years
б(*Sales*)	The standard deviation of *Sales* over years t-4 through t in which I require a minimum of three years of data out of the five years
(*Owner*)^2	The square of *Largest Shareholder*
Coverage	Indicator variable that takes on the value 1 if the issued bond received split bond ratings, and 0 otherwise
Commercial Paper	Indicator variable that takes on the value 1 if the firm received a rating on its commercial paper, and 0 otherwise
Board	Number of directors on the board
Board Out	Number of independent outside directors on the board
AuditCom	Number of members on the audit committee

AuditCom Out	Number of independent outside members on the audit committee
AccExpertise	Number of audit committee members with accounting expertise
FinExpertise	Number of audit committee members with financial expertise
Expertise	Indicator variable that takes on the value 1 if the number of audit committee members with financial or accounting expertise is at least 1, and 0 otherwise
Meeting	Number of meetings held by the audit committee
Volun AuditCom	Indicator variable that takes on the value 1 if a firm (with less than $20 billion of asset) voluntarily establishes the audit committee
Factor1(2,3,4,5)	The principal factor obtained from a factor analysis, with input being the above nine corporate governance variables and *Owner*, for a total of ten variables
D_Board	Indicator variable that takes on the value 1 if the number of directors on the board is greater than the median value, and 0 otherwise
D_Board Out	Indicator variable that takes on the value 1 if the number of outside independent directors on the board is greater than the median value, and 0 otherwise
D_Expertise	Indicator variable that takes on the value 1 if the number of audit committee members with accounting or financial expertise is greater than the median value, and 0 otherwise
Chaebol	Indicator variable that takes on the value 1 if the firm is affiliated with a chaebol, and 0 otherwise
|*Discretionary Accruals*|	Absolute value of performance adjusted discretionary accruals as defined by Kothari et al. 2005); discretionary accrual is estimated as the residuals of the modified Jones (1991) model for each year and industry with 10 or more firms; $TAC_t = \beta_0 + \beta_1 (1/Asset_{t-1}) + \beta_2 (\Delta REV_t - \Delta AR_t) + \beta_3 GPPE_t + \varepsilon$, in which *Asset* is defined as lagged total asset, ΔAR is defined as the change in accounts receivable deflated by lagged total assets and other variables are as defined above; the performance-matched discretionary accruals is obtained by taking the difference between the residual for each firm and the median unadjusted abnormal accruals for the *ROA* decile of the industry and year to which the firm belongs.

FIGURE 1

Relation between Average Bond Rating and Probability of Split Bond Ratings



The graph depicts the relation between average bond rating and the predicted probability for split bond ratings using logistic regression model. The variable *Split* is regressed on *Bond Rating* in a logit estimation model.

TABLE 1
Sample Description

Panel A: Sample Selection Procedure	Number of observations dropped	Remaining observations
(4) Pull all unsecured bonds issued in Korea with maturity longer than 365 days for the period 2000-2010.		6,242
(5) Less: Missing values of accruals quality measure.	2,734	3,508
(6) Less: Missing values of split bond ratings.	913	2,595
(7) Less: Missing values of control variables	116	2,479
(8) Less: Non-December year-end firms	11	**2,468**
Panel B: Distribution of Bond Ratings by NICE	Number of observations	Percentage
AAA, AA+, AA0, AA-	579	25.44%
A+, A0, A-	856	37.57%
BBB+, BBB0, BBB-	678	33.33%
BB+ or below	106	3.66%
Panel C: Distribution of Split Bond Ratings	Number of observations	Percentage
No Split	2,353	95.34%
Split among three credit rating agencies	115	4.66%
Total	2,468	100.00%

This table presents the sample construction process, distribution of bond ratings by one of the major credit rating agencies in Korea, NICE Investors Service Co., and the distribution of split bond ratings for the sample of 2,468 observations for public bonds during the period 2000-2010.

TABLE 2
Descriptive Statistics

Variables	N	Mean	Std. Dev.	Q1	Median	Q3
Accruals Quality Measure						
AQINDEX	2,468	0.382	0.247	0.187	0.343	0.525
DD	2,468	0.053	0.050	0.025	0.039	0.060
MDD	2,468	0.055	0.049	0.026	0.042	0.061
BS	2,468	0.051	0.048	0.023	0.036	0.057
Innate AQ	2,463	0.044	0.032	0.023	0.041	0.061
Disc AQ	2,463	0.011	0.047	-0.018	0.007	0.033
Dependent Variables						
Split	2,468	0.047	0.211	0.000	0.000	0.000
Split Level	2,468	0.050	0.235	0.000	0.000	0.000
Bond Spread	2,468	1.489	1.752	0.570	1.280	2.385
Rating_avg	2,468	6.423	3.004	4.000	7.000	9.000
Control Variables						
Maturity	2,468	6.991	0.398	6.998	6.999	6.999
Face Value	2,468	15.268	1.587	14.914	15.425	16.118
Leverage	2,468	0.262	0.112	0.188	0.267	0.340
Interest Coverage	2,468	8.616	101.211	1.220	2.508	5.217
б(*ROA*)	2,468	0.046	0.050	0.018	0.030	0.053
Size	2,468	21.782	1.182	20.979	21.823	22.599
ROA	2,468	0.024	0.084	0.010	0.033	0.059
Investment Grade	2,468	0.750	0.433	0.000	1.000	1.000
Age	2,468	3.394	0.652	3.178	3.584	3.871
Listed	2,468	0.760	0.427	1.000	1.000	1.000
Public Offering	2,468	0.934	0.249	1.000	1.000	1.000
Loss	2,468	0.147	0.355	0.000	0.000	0.000
Operating Cycle	2,468	4.427	0.535	4.108	4.477	4.763
Owner	2,468	0.359	0.187	0.224	0.334	0.465
Other Variables						
Delisted	2,468	0.022	0.148	0.000	0.000	0.000
б(*Bond Rating*)	2,468	0.060	0.195	0.000	0.000	0.000
Top Underwriter	2,468	0.366	0.482	0.000	0.000	1.000
MTB	1,945	1.209	1.229	0.435	0.902	1.587
NewEq	1,945	0.164	0.903	0.000	0.000	0.007
NumRaters	2,468	2.235	0.424	2.000	2.000	2.000
R&D	2,468	0.010	0.015	0.000	0.003	0.015
б(*CFO*)	2,468	0.062	0.039	0.036	0.052	0.077
б(*Sales*)	2,468	0.183	0.186	0.090	0.148	0.214
(*Owner*)^2	2,468	0.164	0.154	0.050	0.111	0.216

TABLE 3
Correlation Matrix

Pearson Correlation between AQ measures and Credit Risk Measures							
	Split	*Split Level*	*Bond Spread*	*Rating_avg*	*AQINDEX*	*DD*	*MDD*
Split							
Split Level	0.969***						
Bond Spread	0.049*	0.045*					
Rating_avg	0.281***	0.281***	0.336***				
AQINDEX	0.153***	0.147***	0.119***	0.370***			
DD	0.141***	0.138***	0.069***	0.259***	0.825***		
MDD	0.119***	0.112***	0.083***	0.242***	0.854***	0.958***	
BS	0.118***	0.112***	0.085***	0.265***	0.854***	0.940***	0.969***

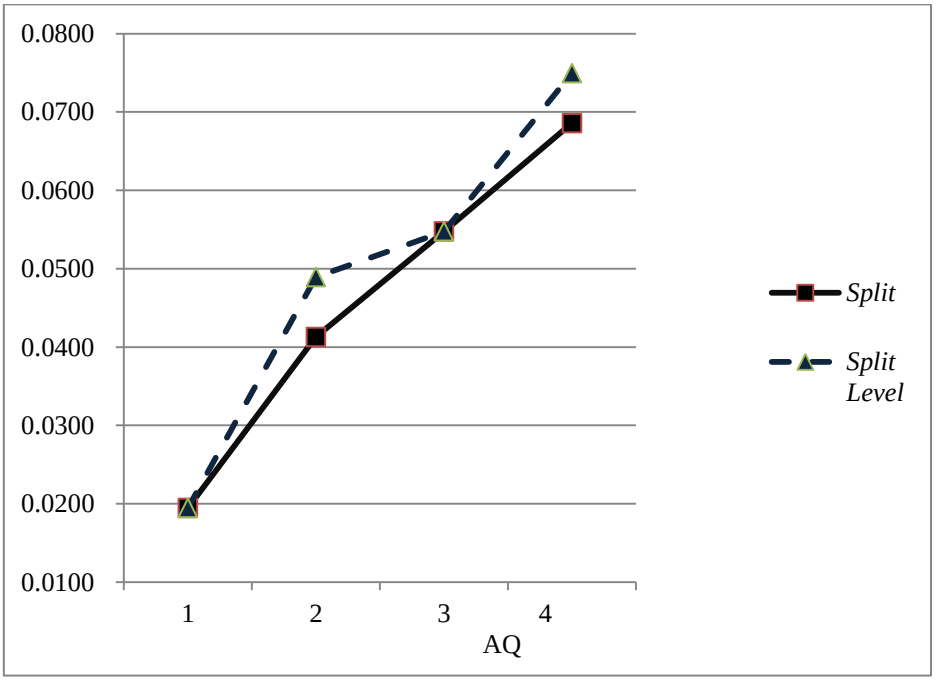
This table presents the Pearson correlation coefficients. The number of observations is 2,468 for public bonds during 2000–2010. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively. See Appendix B for the variable definitions.

TABLE 4

Panel A: Accruals Quality and Credit Risk Measures by *AQ* Quartiles

AQ	**High 1**	**2**	**3**	**Low 4**	**t-test (4) – (1)**
Split	0.019	0.041	0.055	0.069	0.049***
Split Level	0.019	0.049	0.055	0.075	0.056***
Bond Spread	1.220	1.287	1.720	1.713	0.493***
Rating_avg	5.231	6.350	6.326	7.672	2.442***
Face Value	15.424	15.281	15.270	15.113	-0.311***
Maturity	7.122	7.004	6.985	6.864	-0.258***
n	566	654	621	627	

Panel B: AQ Quartiles and Split Bond Ratings Measures



Panel A presents the quartile of *Split*, *Split Level*, *Bond Spread*, *Rating_avg*, *Face Value*, and *Maturity* by accruals quality quartile in which a larger number represents poorer accruals quality. Panel B graphically shows the magnitude of credit risk by *AQ* quartiles.

TABLE 5

The Effect of Accruals Quality on Credit Risk

Variables	***Split*** (1)	***Split Level*** (2)
AQINDEX	**0.131****	**0.144****
	(2.12)	**(2.13)**
Maturity	0.025	0.021
	(0.99)	(0.69)
Face value	-0.004	-0.005
	(-1.64)	(-1.36)
Leverage	-0.126*	-0.136
	(-1.75)	(-1.46)
Interest Coverage	0.000	0.000
	(-1.23)	(-0.48)
б(*ROA*)	-0.529	-0.592
	(-1.48)	(-1.55)
Size	-0.009	-0.006
	(-1.20)	(-0.68)
ROA	-0.547**	-0.611*
	(-2.06)	(-1.93)
Investment Grade	-0.010	-0.016
	(-0.41)	(-0.51)
Age	-0.015	-0.014
	(-1.62)	(-1.33)
Listed	-0.050*	-0.060**
	(-1.94)	(-2.08)
Public Offering	-0.061*	-0.038
	(-1.72)	(-0.75)
Loss	-0.006	0.000
	(-0.25)	(0.01)
Operating Cycle	-0.008	-0.008
	(-0.59)	(-0.54)
Owner	-0.167**	-0.175**
	(-2.28)	(-2.36)
Intercept	0.357	0.312
	(1.50)	(1.08)
Industry Effects	Included	Included
Year Effects	Included	Included
N	2,468	2,468
Adj. R^2	0.131	0.116

This table reports the regression results for the split bond rating measures on *AQINDEX*. The sample is composed of 2,468 observations for the public bonds during 2000–2010. See Appendix B for the variable definitions. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

TABLE 6

Multivariate Analysis of Split Bond Ratings and Individual Measures of Accruals Quality

Dependent Variable = *Split*			
AQ =	***DD***	***MDD***	***BS***
	(1)	(2)	(3)
AQ	**0.937****	**0.767****	**0.788****
	(2.46)	**(2.32)**	**(2.26)**
Maturity	0.023	0.022	0.022
	(0.96)	(0.90)	(0.91)
Face value	-0.004	-0.004	-0.004
	(-1.44)	(-1.52)	(-1.59)
Leverage	-0.134*	-0.132*	-0.129*
	(-1.86)	(-1.79)	(-1.76)
Interest Coverage	0.000	0.000	0.000
	(-1.26)	(-1.32)	(-1.18)
б(*ROA*)	-0.865**	-0.715*	-0.735*
	(-2.01)	(-1.82)	(-1.82)
Size	-0.009	-0.010	-0.010
	(-1.29)	(-1.39)	(-1.30)
ROA	-0.632**	-0.580**	-0.596**
	(-2.38)	(-2.16)	(-2.14)
Investment Grade	-0.014	-0.014	-0.017
	(-0.56)	(-0.56)	(-0.66)
Age	-0.016*	-0.015	-0.014
	(-1.67)	(-1.60)	(-1.48)
Listed	-0.057**	-0.053**	-0.051**
	(-2.12)	(-2.01)	(-1.98)
Public Offering	-0.065*	-0.066*	-0.066*
	(-1.92)	(-1.90)	(-1.90)
Loss	-0.009	-0.005	-0.008
	(-0.38)	(-0.20)	(-0.33)
Operating Cycle	-0.010	-0.007	-0.008
	(-0.76)	(-0.52)	(-0.63)
Owner	-0.182**	-0.173**	-0.170**
	(-2.42)	(-2.34)	(-2.30)
Intercept	0.422*	0.408*	0.415*
	(1.84)	(1.82)	(1.81)
Industry Effects	Included	Included	Included
Year Effects	Included	Included	Included
N	2,468	2,468	2,468
Adj. R^2	0.138	0.132	0.131

This table reports the regression results for the effect of the individual measures of accruals quality on split bond ratings (*Split*). DD = Dechow and Dichev (2002) model, MDD = Modified

Dechow and Dichev (2002) model, and BS = Ball and Shivakumar (2006) model. All variables are defined in Appendix B. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 7

(Ordered) Logistic Regression of the Effect of Accruals Quality on Credit Risk Measures

Variables	***Split*** (1)	Average Marginal Effects[a]	***Split Level*** (2)	Average Marginal Effects[b]
AQINDEX	**3.101*** **	0.110	**3.039*** **	0.098
	(2.69)		**(2.73)**	
Maturity	0.316	0.011	0.301	0.010
	(0.41)		(0.40)	
Face value	-0.159**	-0.006	-0.158**	-0.005
	(-2.02)		(-2.04)	
Leverage	-2.068	-0.074	-2.104	-0.068
	(-0.90)		(-0.89)	
Interest Coverage	-0.024	-0.001	-0.023	-0.001
	(-0.45)		(-0.44)	
б(*ROA*)	-14.563**	-0.519	-14.470**	-0.466
	(-2.07)		(-2.09)	
Size	-0.350**	-0.012	-0.329*	-0.011
	(-2.06)		(-1.89)	
ROA	-7.122***	-0.254	-7.054***	-0.227
	(-2.98)		(-2.90)	
Investment Grade	0.141	0.005	0.111	0.004
	(0.28)		(0.21)	
Age	-0.495	-0.018	-0.480	-0.015
	(-1.40)		(-1.36)	
Listed	-0.467	-0.017	-0.465	-0.015
	(-0.64)		(-0.64)	
Public Offering	-0.385	-0.014	-0.266	-0.009
	(-0.61)		(-0.36)	
Loss	0.289	0.010	0.321	0.010
	(0.48)		(0.54)	
Operating Cycle	-0.119	-0.004	-0.118	-0.004
	(-0.27)		(-0.27)	
Owner	-4.044**	-0.144	-3.986**	-0.128
	(-2.22)		(-2.21)	
Intercept	-21.894***		24.159***	
	(-2.93)		(3.19)	
Industry Effects	Included		Included	
Year Effects	Included		Included	

N	2,468	2,468
Pseudo R^2	0.322	0.298

This table reports the logistic regression results for *Split* on *AQINDEX*, and ordered logistic regression results for *Split Level* on AQINDEX. *Split* is an indicator variable that takes on the value 1 if any of the three credit rating agencies, Korea Ratings (KR), NICE, and Korea Investors Service (KIS), report different ratings. *Split Level* is an ordinal variable that takes on the value 0, 1, and 2 when the ratings differ by 0, 1, and 2 or greater than 2 notches. See Appendix B for all other variable definitions. The sample is composed of 2,468 observations for the public bonds during 2000–2010. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

[a]The marginal effect is first computed for each observation. The average marginal effect is then computed as the sample average of all individual marginal effects.

[b]The average marginal effect is computed as the sample average of all individual marginal effects for the outcome when *Split Level* is set to 1.

TABLE 8

The Effect of Downgrade and Upgrade on the Relation between *AQINDEX* and Split Bond Ratings

	Dependent Variable = *Split*					
Control Variable =	**Downgrade**	**Inv to Non-Inv**	**Upgrade**	**Non-Inv to Inv**	**Without Down-grades**	**Only Upgrades**
Variables	(1)	(2)	(3)	(4)	(5)	(6)
AQINDEX	**0.125****	**0.130****	**0.132****	**0.130****	**0.113****	**0.263**
	(2.18)	**(2.15)**	**(2.12)**	**(2.09)**	**(2.01)**	**(1.42)**
Maturity	0.019	0.024	0.023	0.025	0.021	0.076
	(0.88)	(0.96)	(1.00)	(0.99)	(0.94)	(1.37)
Face value	-0.004*	-0.005	-0.005	-0.004	-0.004	0.001
	(-1.68)	(-1.65)	(-1.61)	(-1.63)	(-1.51)	(0.29)
Leverage	-0.112*	-0.126*	-0.130*	-0.126*	-0.100*	-0.120
	(-1.80)	(-1.76)	(-1.70)	(-1.75)	(-1.67)	(-0.57)
Interest Coverage	-0.000**	0.000	0.000	0.000	0.000	-0.005
	(-2.03)	(-1.15)	(-1.38)	(-1.23)	(-0.88)	(-0.85)
б(*ROA*)	-0.490	-0.522	-0.531	-0.529	-0.449	0.160
	(-1.44)	(-1.48)	(-1.48)	(-1.48)	(-1.35)	(0.44)
Size	-0.010	-0.009	-0.009	-0.009	-0.012*	-0.027
	(-1.41)	(-1.15)	(-1.11)	(-1.19)	(-1.73)	(-1.11)
ROA	-0.572**	-0.553**	-0.535**	-0.545**	-0.529**	0.221
	(-2.35)	(-2.08)	(-2.11)	(-2.02)	(-2.20)	(0.62)
Investment Grade	-0.001	-0.009	-0.010	-0.010	0.002	-0.047
	(-0.03)	(-0.36)	(-0.40)	(-0.40)	(0.07)	(-0.61)
Age	-0.016*	-0.016	-0.015	-0.016	-0.016*	-0.040
	(-1.80)	(-1.62)	(-1.47)	(-1.62)	(-1.80)	(-1.13)
Listed	-0.048**	-0.048*	-0.051*	-0.050*	-0.048**	0.073
	(-2.01)	(-1.90)	(-1.93)	(-1.95)	(-2.11)	(0.87)
Public Offering	-0.042	-0.058	-0.065*	-0.061*	-0.060**	-0.033
	(-1.36)	(-1.65)	(-1.93)	(-1.72)	(-2.03)	(-0.96)
Loss	-0.014	-0.007	-0.004	-0.006	-0.013	-0.013
	(-0.60)	(-0.27)	(-0.17)	(-0.24)	(-0.61)	(-0.17)
Operating Cycle	-0.004	-0.007	-0.009	-0.008	-0.002	0.069
	(-0.37)	(-0.58)	(-0.67)	(-0.59)	(-0.17)	(1.04)
Owner	-0.175**	-0.162**	-0.166**	-0.168**	-0.186***	0.039
	(-2.53)	(-2.29)	(-2.27)	(-2.28)	(-2.82)	(0.23)
Downgrade	0.586***					
	(4.65)					
Inv_Noninv		0.379				
		(1.27)				

Upgrade			-0.058			
			(-1.22)			
Noninv_Inv				0.068		
				(0.23)		
Intercept	0.707***	0.663**	0.688**	0.676**	0.482**	-0.207
	(3.06)	(2.40)	(2.59)	(2.41)	(2.37)	(-0.33)
Industry Effects	Included	Included	Included	Included	Included	Included
Year Effects	Included	Included	Included	Included	Included	Included
N	2,468	2,468	2,468	2,468	2,450	71
Adj. R^2	0.184	0.133	0.132	0.130	0.125	0.247

This table presents the regression results on the effect of accruals quality (*AQINDEX*) and split bond ratings (*SPLIT*) after controlling for upgrades, downgrades, bonds that receive a rating that result in changing its status from investment to non-investment grade, and bonds that receive a rating that result in changing its status from non-investment to investment grade. The sample is composed of 2,468 observations for public bonds issued during 2000–2010 for columns (1) through (4) while the number of observations reduces to 2,450 in column (5) by excluding downgrades, and reduces to 71 in column (6) by limiting the sample to upgrades only. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

TABLE 9

The Effect of Information Asymmetry on the relation between *AQINDEX* and Split Bond Ratings

	Dependent Variable = *Split*				
VAR =	**б(*Bond Rating*)**	***Delisted***	**б(*ROA*)**	***Private Placement***	***LowQual Underwriter***
Variables	(1)	(2)	(3)	(4)	(5)
AQINDEX	0.029	0.121**	0.062	0.114**	0.052
	(1.02)	(1.98)	(1.00)	(2.02)	(0.83)
***AQINDEX* x VAR**	**0.934****	**0.491*****	**1.674***	**0.290*****	**0.121***
	(2.51)	**(4.79)**	**(1.93)**	**(2.88)**	**(1.66)**
б(*Bond Rating*)	0.143				
	(0.70)				
Delisted		-0.153***			
		(-4.23)			
Private Placement				-0.075	
				(-0.96)	
ROA(-1)*					
LowQual Underwriter					-0.034
					(-1.40)
Maturity	0.037	0.029	0.024	0.022	0.024
	(1.51)	(1.15)	(0.96)	(0.91)	(0.99)
Face value	-0.001	-0.004*	-0.004	-0.005*	-0.004
	(-0.73)	(-1.66)	(-1.44)	(-1.70)	(-1.62)
Leverage	-0.047	-0.113	-0.129*	-0.120*	-0.136*
	(-1.13)	(-1.56)	(-1.80)	(-1.71)	(-1.84)
Interest Coverage	0.000	0.000	0.000	0.000	0.000
	(-0.36)	(-1.38)	(-1.30)	(0.36)	(-1.25)
б(*ROA*)	-0.315	-0.505	-1.799**	-0.556*	-0.585*
	(-1.33)	(-1.43)	(-2.55)	(-1.66)	(-1.67)
Size	-0.572**	-0.519*	-0.668**	-0.009	-0.010
	(-2.35)	(-1.91)	(-2.38)	(-1.25)	(-1.32)
ROA	-0.016***	-0.009	-0.010	-0.528**	-0.555**
	(-2.96)	(-1.24)	(-1.44)	(-2.22)	(-2.15)
Investment Grade	0.010	-0.013	-0.012	-0.010	-0.010
	(0.64)	(-0.53)	(-0.47)	(-0.40)	(-0.42)
Age	-0.002	-0.012	-0.016	-0.016*	-0.016
	(-0.23)	(-1.26)	(-1.61)	(-1.67)	(-1.62)
Listed	-0.038**	-0.041	-0.049**	-0.046*	-0.051*
	(-2.35)	(-1.61)	(-1.98)	(-1.83)	(-1.95)
Public	-0.026	-0.062*	-0.062*		-0.061*

Offering					
	(-0.90)	(-1.80)	(-1.71)		(-1.77)
Loss	-0.024	-0.002	-0.002	-0.006	-0.006
	(-0.83)	(-0.08)	(-0.07)	(-0.27)	(-0.25)
Operating Cycle	-0.005	-0.007	-0.010	-0.005	-0.008
	(-0.44)	(-0.58)	(-0.76)	(-0.42)	(-0.62)
Owner	-0.125**	-0.153**	-0.164**	-0.159**	-0.170**
	(-2.40)	(-2.08)	(-2.20)	(-2.19)	(-2.26)
Intercept	0.247	0.320	0.437**	0.317	0.412*
	(1.50)	(1.35)	(2.07)	(1.39)	(1.89)
Industry Effects	Included	Included	Included	Included	Included
Year Effects	Included	Included	Included	Included	Included
N	2,468	2,468	2,468	2,468	2,468
Adj. R^2	0.361	0.136	0.139	0.137	0.135

This table reports the regression results on the effect of accruals quality (*AQINDEX*) and its interactions with five measures of information asymmetry and split bond ratings (*Split*). The sample is composed of 2,468 observations for the public bonds during 2000–2010. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

TABLE 10

Additional Analyses related to Corporate Governance

Panel A: The Effect of Corporate Governance on the association between Split Bond Rating and Accruals Quality

Variables	***Split*** (1)	***Split Level*** (2)	***Bond Spread*** (3)	***Split*** (4)	***Split Level*** (5)	***Bond Spread*** (6)
AQINDEX	**0.157****	**0.167****	**1.316****	**0.163***	**0.171***	**1.366****
	(2.00)	**(2.04)**	**(2.26)**	**(1.93)**	**(1.97)**	**(2.38)**
Maturity	0.001	0.014	-0.672**	0.005	0.017	-0.615**
	(0.08)	(0.53)	(-2.64)	(0.27)	(0.63)	(-2.63)
Face value	-0.004	-0.006	0.373***	-0.003	-0.006	0.369***
	(-1.33)	(-1.20)	(4.95)	(-0.99)	(-1.02)	(4.77)
Leverage	-0.160**	-0.199***	1.954*	-0.139**	-0.179**	2.098**
	(-2.35)	(-2.67)	(1.99)	(-2.06)	(-2.36)	(2.09)
Interest Coverage	0.000	0.000	0.000	0.000	0.000	0.000
	(0.44)	(0.66)	(-0.42)	(0.38)	(0.69)	(-0.29)
б(*ROA*)	-0.672*	-0.599	-4.765	-0.661*	-0.600	-6.138*
	(-1.72)	(-1.55)	(-1.56)	(-1.70)	(-1.54)	(-1.94)
Size	0.014	0.016	-0.351*	-0.001	0.004	-0.468**
	(1.06)	(1.11)	(-1.83)	(-0.06)	(0.27)	(-2.47)
ROA	-0.466***	-0.720***	1.721	-0.434**	-0.686***	1.103
	(-2.71)	(-3.32)	(1.09)	(-2.20)	(-2.83)	(0.72)
Investment Grade	0.031	0.023	-0.324	0.042	0.031	-0.295
	(1.00)	(0.65)	(-0.90)	(1.26)	(0.81)	(-0.83)
Age	-0.011	-0.011	-0.074	-0.009	-0.010	-0.123

	(-0.65)	(-0.65)	(-0.62)	(-0.55)	(-0.63)	(-0.92)
Listed	-0.082	-0.087	0.544	-0.042	-0.052	0.473
	(-1.30)	(-1.31)	(1.53)	(-0.65)	(-0.77)	(1.43)
Public Offering	-0.006	0.015	-0.510	-0.010	0.013	-0.574
	(-0.25)	(0.29)	(-1.10)	(-0.40)	(0.24)	(-1.27)
Loss	-0.042	-0.050	0.463	-0.035	-0.044	0.421
	(-1.16)	(-1.31)	(1.17)	(-0.92)	(-1.11)	(1.13)
Operating Cycle	-0.014	-0.017	0.368*	-0.016	-0.017	0.437**
	(-0.98)	(-1.05)	(1.82)	(-1.14)	(-1.11)	(2.07)
Factor1	-0.018	-0.016	0.076			
	(-1.21)	(-1.07)	(0.53)			
Factor2	0.013	0.018	0.335***			
	(1.33)	(1.52)	(4.87)			
Factor3	-0.009	-0.007	-0.229**			
	(-0.98)	(-0.77)	(-2.10)			
Factor4	-0.020	-0.022*	0.074			
	(-1.62)	(-1.73)	(0.78)			
Factor5	-0.042**	-0.052**	-0.121			
	(-2.60)	(-2.62)	(-0.47)			
Board				-0.008**	-0.008**	0.044
				(-2.56)	(-2.33)	(1.27)
Board Out				0.008	0.011	0.016
				(1.26)	(1.35)	(0.28)
AuditCom				-0.064	-0.053	0.328
				(-1.14)	(-0.85)	(0.63)

AuditCom Out				0.044	0.034	-0.548
				(0.85)	(0.60)	(-1.16)
AccExpertise				-0.026	-0.027	0.018
				(-1.43)	(-1.43)	(0.09)
FinExpertise				-0.011	-0.016	0.285*
				(-0.79)	(-0.91)	(1.98)
Expertise				-0.046	-0.053	-0.481
				(-1.42)	(-1.66)	(-1.53)
Meeting				0.000	-0.001	0.015
				(-0.70)	(-1.04)	(1.45)
Owner				0.015	-0.016	-1.297
				(0.17)	(-0.17)	(-1.00)
Volun AuditCom				-0.069*	-0.063*	-0.735**
				(-1.95)	(-1.79)	(-2.47)
Intercept	-0.006	-0.088	5.315	0.412	0.278	8.435*
	(-0.02)	(-0.22)	(1.30)	(1.29)	(0.68)	(1.96)
Industry Effects	Included	Included	Included	Included	Included	Included
Year Effects	Included	Included	Included	Included	Included	Included
N	706	706	706	706	706	706
Adj. R^2	0.164	0.155	0.407	0.175	0.159	0.419

TABLE 10 (Continued)

Panel B: Subsample Analysis based on Corporate Governance Variables

	Board Characteristics				Audit Committee Characteristics				Chaebol Affiliation	
	Board Size (1) *D_Board*		Board Independence (2) *D_Board Out*		Expertise of Audit Committee Members (3) *D_Expertise*		Voluntary establishment of the Audit Committee (4) *Volun AuditCom*		Business Group (Chaebol) Affiliation (5) *Chaebol*	
Variables	Low	High	Low	High	Low	High	Low	High	No	Yes
AQINDEX	**0.379*** **	**-0.132**	**0.303** **	**0.084**	**0.161* **	**0.004**	**0.248* **	**-0.044**	**0.440** **	**0.115**
	(2.79)	**(-1.24)**	**(2.13)**	**(1.16)**	**(1.95)**	**(0.35)**	**(1.85)**	**(-0.70)**	**(2.52)**	**(1.48)**
Maturity	0.044	-0.005	0.037	-0.004	-0.005	0.007	0.033	-0.004	0.091	-0.014
	(1.19)	(-0.18)	(0.87)	(-0.19)	(-0.16)	(1.34)	(1.06)	(-0.14)	(0.85)	(-0.98)
Face value	-0.014	-0.004	-0.015*	-0.006	-0.004	0.000	-0.008	-0.006	-0.047**	-0.001
	(-1.48)	(-0.78)	(-1.77)	(-1.15)	(-0.90)	(0.51)	(-1.61)	(-0.92)	(-2.21)	(-0.56)
Leverage	-0.190*	-0.194**	-0.246***	-0.029	-0.257**	-0.026	-0.235**	-0.148	-0.477	-0.153**
	(-1.91)	(-2.64)	(-2.82)	(-0.39)	(-2.30)	(-0.82)	(-2.55)	(-0.87)	(-1.39)	(-2.27)
Interest Coverage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.003	0.000
	(-0.42)	(-1.14)	(-0.75)	(0.93)	(-0.27)	(0.11)	(0.34)	(-0.54)	(-0.95)	(-0.30)
б(*ROA*)	-2.288***	0.489	-1.750**	-0.206	-0.586	-0.020	-1.042*	-1.131	-1.217	-0.716
	(-2.69)	(1.51)	(-2.22)	(-0.63)	(-1.22)	(-0.53)	(-1.71)	(-0.92)	(-1.44)	(-1.34)
Size	-0.014	-0.026	-0.022*	0.014	0.013	-0.008	-0.020*	0.001	-0.078*	0.000
	(-0.97)	(-1.21)	(-1.91)	(0.89)	(0.75)	(-1.16)	(-1.74)	(0.04)	(-1.72)	(0.01)
ROA	0.320	-0.833***	0.038	-0.778***	-0.868***	0.141	-0.456*	0.484	-0.328	-0.339

	(0.90)	(-4.46)	(0.11)	(-3.96)	(-3.30)	(1.32)	(-1.81)	(0.99)	(-0.97)	(-1.44)
Investment Grade	-0.010	-0.049	-0.031	0.012	0.046*	-0.011	-0.010	0.007	-0.011	0.024
	(-0.29)	(-0.99)	(-0.80)	(0.31)	(1.76)	(-1.26)	(-0.30)	(0.38)	(-0.16)	(1.06)
Age	-0.026	0.015	-0.003	-0.033	-0.012	0.030	-0.013	0.026	0.040	-0.019
	(-1.30)	(0.64)	(-0.16)	(-1.02)	(-0.78)	(1.35)	(-0.55)	(1.67)	(0.51)	(-1.26)
Listed	-0.030	0.091	-0.046	0.022	-0.114	-0.085***	-0.050	0.017	0.183**	-0.066
	(-0.64)	(1.23)	(-1.02)	(0.50)	(-1.16)	(-5.87)	(-0.86)	(0.42)	(2.31)	(-1.05)
Public Offering	-0.012	0.018	-0.008	0.038	-0.013	-0.003	-0.015	-0.064	0.053	-0.010
	(-0.50)	(0.42)	(-0.31)	(0.84)	(-0.36)	(-0.54)	(-0.63)	(-0.99)	(0.88)	(-1.10)
Loss	0.035	-0.096**	0.001	-0.079	-0.042	0.025	-0.047	0.038	0.169	-0.034
	(0.82)	(-2.06)	(0.02)	(-1.51)	(-1.14)	(1.22)	(-1.18)	(0.93)	(1.45)	(-0.98)
Operating Cycle	0.018	0.030	0.006	-0.003	-0.005	-0.003	0.003	0.076	-0.068	-0.003
	(0.92)	(0.89)	(0.29)	(-0.11)	(-0.20)	(-0.64)	(0.18)	(0.67)	(-1.06)	(-0.21)
Intercept	0.358	0.590	0.548	-0.128	0.281	0.155	0.504*	-0.238	1.815	0.376**
	(1.11)	(1.31)	(1.48)	(-0.29)	(0.57)	(1.49)	(1.81)	(-0.58)	(1.50)	(2.30)
Year effects	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry effects	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
N	567	447	642	372	462	244	908	106	225	789
Adjusted R^2	0.219	0.096	0.166	0.121	0.221	0.011	0.132	0.111	0.251	0.113

Panel A reports the results on the effect of corporate governance on the association between split bond rating and accruals quality. There are ten variables related to corporate governance and because some variables are highly correlated, I use principal component analysis (PCA) to classify the original variables into multiple aspects of governance quality of a firm and obtain factor scores that would be used in the regression analyses. I use the scree test in order to determine the number of factors to retain. In the scree test, the eigenvalues associated with each component are plotted and breaks between the components with relatively large eigenvalues and those with small eigenvalues are identified. The components that appear before the break are assumed to be meaningful and are retained. This procedure results in five factors. In Panel A, the requirement for the corporate governance related variables in obtaining the factors

reduces the number of observations to 706 for the period 2003-2006. Models (1)-(3) include these five factors while models (4)-(6) include all of the ten corporate governance variables. Panel B presents the subsample analysis, using three aspects of corporate governance, which are board characteristics, audit committee characteristics, and Chaebol affiliation. The number of observations used for models (1), (2), (4), (5) is 1,014 while the lack of observations for audit committee expertise reduces the number of observations for model (3) to 706 for the period 2003-2006. All variables are defined in Appendix B. All regressions include year and industry fixed effects. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 11

Additional Analyses on the Effect of Accruals Quality on Split Bond Ratings for Issuers with Deteriorating Accruals Quality Measures

	Dependent Variable = *Split*			
AQ =	***AQINDEX_CH***	***DD_CH***	***MDD_CH***	***BS_CH***
	(1)	(2)	(3)	(4)
AQ	**0.157****	**0.109****	**0.092****	**0.089****
	(2.51)	**(2.44)**	**(2.08)**	**(2.14)**
Maturity	-0.009	-0.008	-0.008	-0.013
	(-0.41)	(-0.36)	(-0.38)	(-0.63)
Face value	-0.002	-0.002	-0.002	-0.002
	(-0.74)	(-0.64)	(-0.73)	(-0.79)
Leverage	-0.102	-0.086	-0.102	-0.107
	(-1.35)	(-1.16)	(-1.34)	(-1.36)
Interest Coverage	-0.000**	-0.000**	-0.000**	-0.000**
	(-2.40)	(-2.19)	(-2.05)	(-2.10)
б(*ROA*)	-0.236	-0.203	-0.195	-0.216
	(-0.81)	(-0.68)	(-0.61)	(-0.72)
Size	0.000	0.000	0.001	0.000
	(0.03)	(0.00)	(0.10)	(-0.01)
ROA	-0.496*	-0.517*	-0.481*	-0.498*
	(-1.92)	(-1.91)	(-1.87)	(-1.87)
Investment Grade	0.023	0.027	0.022	0.020
	(0.84)	(1.01)	(0.82)	(0.73)
Age	-0.002	0.001	-0.002	-0.003
	(-0.17)	(0.09)	(-0.15)	(-0.21)
Listed	-0.032	-0.034	-0.030	-0.031
	(-1.32)	(-1.40)	(-1.23)	(-1.26)
Public Offering	-0.113***	-0.112***	-0.115***	-0.113***
	(-3.10)	(-3.10)	(-3.16)	(-3.10)
Loss	-0.015	-0.015	-0.009	-0.012
	(-0.65)	(-0.61)	(-0.38)	(-0.50)
Operating Cycle	-0.017	-0.013	-0.014	-0.017
	(-1.04)	(-0.80)	(-0.88)	(-1.04)
Owner	-0.027	-0.023	-0.025	-0.031
	(-0.37)	(-0.32)	(-0.33)	(-0.42)
Intercept	0.232	0.214	0.243	0.318*
	(1.18)	(1.05)	(1.22)	(1.74)
Industry Effects	Included	Included	Included	Included

Year Effects	Included	Included	Included	Included
N	1,666	1,666	1,666	1,666
Adj. R^2	0.156	0.153	0.150	0.150

This table presents the effect of accruals quality on split bond ratings for issuers with deteriorating accruals quality index. *DD_CH*, *MDD_CH*, and *BS_CH* captures the change in the percentile rank values of residuals estimated from the DD (Dechow and Dichev (2002)), MDD (Modified Dechow and Dichev (2002)), and BS (Ball and Shivakumar (2006)) models, respectively. *AQINDEX_CH* is the average of *DD_CH*, *MDD_CH*, and *BS_CH*. The analysis focuses on issuers with deteriorating accruals quality measures in which any of *DD_CH*, *MDD_CH*, and *BS_CH* increased (i.e., accruals quality decreased) compared to prior year. The sample is composed of 1,666 observations for public bonds during 2000–2010. See Appendix B for other variable definitions. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

TABLE 12

Heckman Selection Model Estimates of the relation between Split Bond Ratings and Accruals Quality

Panel A: First-stage regression results for the determinants of rating agency's coverage

Dependent Variable = *Coverage*		
	Coefficient	*z*-stat
AQINDEX	-0.170	-1.22
Maturity	0.121	1.33
Face value	0.099***	5.45
Leverage	-0.077	-0.29
Interest Coverage	-0.008***	-2.67
б(*ROA*)	0.974	1.50
Size	0.416***	16.92
ROA	-1.232***	-2.82
Age	0.201***	3.77
Listed	0.528***	6.37
Loss	-0.602***	-6.32
Operating Cycle	0.007	0.14
Owner	2.019***	9.56
Commercial Paper	0.349***	5.29
Intercept	-12.074***	-13.13
Industry Effects	Included	Included
Year Effects	Included	Included
lamda	0.124***	3.05
N	3,489	

Panel B: Second-stage regression results for the determinants of split bond ratings

Dependent Variable = *Split*		
	Coefficient	*t*-stat
AQINDEX	**0.124****	**2.05**
Maturity	0.023	0.90
Face value	0.000	0.06
Leverage	-0.120	-1.54
Interest Coverage	-0.001	-1.27
б(*ROA*)	-0.485	-1.48
Size	0.013	0.96
ROA	-0.566**	-2.28
Investment Grade	-0.008	-0.31
Age	-0.007	-0.57
Listed	-0.026	-0.95

Public Offering	-0.060*		-1.75
Loss	-0.031		-1.22
Operating Cycle	-0.005		-0.37
Owner	-0.067		-0.74
Inverse Mills Ratio	0.124*		1.67
Intercept	-0.309		-0.66
Industry Effects	Included		Included
Year Effects	Included		Included
N		2,459	
Adj. R^2		0.144	

This table presents the selection adjusted estimates using a maximum likelihood estimator (MLE) version of the Heckman (1979) selection model to examine the effect of accruals quality on split bond ratings. The dependent variables are coverage and split bond ratings in Panel A and B, respectively. Panel A provides the results for the first-stage regression model in the Heckman selection model as follows: *Coverage* = a + α_0 *AQINDEX* + α_1 *Maturity* + α_2 *Face value* + α_3 *Leverage* + α_4 *Interest Coverage* + α_5 *б(ROA)* + α_6 *Size* + α_7 *ROA* + α_8 *Age* + α_9 *Listed* + α_{10} *Loss* + α_{11} *Operating Cycle* + α_{12} *Owner* + α_{13} *Commercial Paper* + year and industry fixed effects + ε. Panel B shows the results based on the second-stage regression model that includes the Inverse Mill's ratio, which is: *Split* = a + α_0 *AQINDEX* + α_1 *Maturity* + α_2 *Face value* + α_3 *Leverage* + α_4 *Interest Coverage* + α_5 *б(ROA)* + α_6 *Size* + α_7 *ROA* + α_8 *Investment Grade* + α_9 *Age* + α_{10} *Listed* + α_{11} *Public Offering* + α_{12} *Loss* + α_{13} *Operating Cycle* + α_{14} *Owner* + α_{15} *Inverse Mills Ratio* + year and industry fixed effects + ε.

The sample for regressions models in Panel A and B is composed of 3,489 and 2,459 observations for public bonds during 2000–2010. All variables are defined in Appendix B. All regressions include year and industry fixed effects. To adjust for heteroskedasticity, standard errors are clustered at the firm-level. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively.

TABLE 13

Analyses based on Alternative Measures of Credit Risk

	Bond Spread	***Rating_avg***
Variables	(1)	(2)
AQINDEX	**1.006*** **	**2.192*** **
	(3.53)	**(4.71)**
Maturity	-0.289	-1.149***
	(-1.35)	(-8.47)
Face value	0.380***	0.011
	(12.13)	(0.35)
Leverage	1.778***	1.094
	(3.32)	(0.93)
Interest Coverage	0.000	-0.001
	(-0.74)	(-1.32)
б(*ROA*)	-4.943***	-4.458*
	(-2.84)	(-1.69)
Size	-0.317***	-0.583***
	(-5.83)	(-5.09)
ROA	1.708*	-8.017***
	(1.92)	(-4.28)
Investment Grade	-1.216***	-2.047***
	(-5.90)	(-10.17)
Age	0.029	0.298
	(0.32)	(1.59)
Listed	0.223	-0.300
	(1.28)	(-0.75)
Public Offering	-0.484	-0.815***
	(-1.63)	(-3.41)
Loss	0.072	0.217
	(0.33)	(0.83)
Operating Cycle	0.538***	0.543**
	(5.30)	(2.58)
Owner	-0.503	-1.118
	(-1.11)	(-1.47)
|*Discretionary Accruals*|	0.968	1.935
	(1.01)	(1.35)
Intercept	1.707	25.601***
	(0.99)	(11.57)
Industry Effects	Included	Included
Year Effects	Included	Included
N	2,468	2,468
Adj. R^2	0.441	0.789

To provide some complementary evidence on other forms of debt financing, this table presents the results using additional measures of credit risks, *Bond Spread* and *Rating_avg*, as the dependent variable. Column (1) and (2) show the estimation results in which the dependent variable is *Bond Spread* and *Rating_avg*, respectively. In the regression model, I add the absolute value of discretionary accruals as additional control variable to show that the relation between *AQINDEX* and cost of debt capital remains strong, even after controlling for the effect of discretionary accruals. The sample is composed of 2,468 observations for public bonds during 2000–2010. See Appendix B for the variable definitions. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

TABLE 14

The Association between Split Bond Rating and Accruals Quality Index Quartiles

Variables	***Split*** (1)	***Split Level*** (2)	***Bond Spread*** (3)	***Rating_avg*** (4)
AQ2	**0.018**	**0.025**	**0.058**	**0.598*** **
	(1.10)	**(1.48)**	**(0.45)**	**(3.02)**
AQ3	**0.041** **	**0.042** **	**0.364*** **	**0.658*** **
	(2.05)	**(2.05)**	**(3.40)**	**(3.16)**
AQ4	**0.049* **	**0.058* **	**0.386** **	**1.279*** **
	(1.91)	**(1.93)**	**(2.56)**	**(4.66)**
Maturity	0.025	0.022	-0.295	-1.110***
	(1.00)	(0.70)	(-1.40)	(-7.86)
Face value	-0.005	-0.005	0.379***	0.005
	(-1.65)	(-1.39)	(12.04)	(0.17)
Leverage	-0.124*	-0.134	1.753***	1.014
	(-1.72)	(-1.43)	(3.33)	(0.85)
Interest Coverage	0.000	0.000	0.000	-0.001
	(-1.42)	(-0.68)	(-0.77)	(-1.24)
б(*ROA*)	-0.295	-0.343	-3.257**	-2.165
	(-1.00)	(-1.07)	(-2.17)	(-0.84)
Size	-0.011	-0.008	-0.327***	-0.588***
	(-1.27)	(-0.80)	(-6.23)	(-5.15)
ROA	-0.496*	-0.547*	2.082**	-6.651***
	(-1.78)	(-1.68)	(2.06)	(-3.41)
Investment Grade	-0.013	-0.019	-1.228***	-2.111***
	(-0.51)	(-0.61)	(-5.90)	(-10.16)
Age	-0.011	-0.010	0.057	0.327*
	(-1.24)	(-0.96)	(0.61)	(1.74)
Listed	-0.055**	-0.066**	0.199	-0.388
	(-2.07)	(-2.21)	(1.17)	(-1.00)
Public Offering	-0.059*	-0.036	-0.463	-0.764***
	(-1.68)	(-0.71)	(-1.58)	(-3.32)
Loss	-0.001	0.006	0.124	0.392
	(-0.06)	(0.21)	(0.56)	(1.27)
Operating Cycle	-0.005	-0.005	0.563***	0.623***
	(-0.37)	(-0.32)	(5.44)	(2.96)
Owner	-0.174**	-0.182**	-0.531	-1.239
	(-2.28)	(-2.37)	(-1.19)	(-1.64)
Intercept	0.371	0.322	2.991	23.832***

	(1.42)	(1.03)	(1.57)	(10.15)
Industry Effects	Included	Included	Included	Included
Year Effects	Included	Included	Included	Included
N	2,468	2,468	2,468	2,468
Adj. R^2	0.124	0.109	0.437	0.787

This table presents the estimates of bond issuing firms quartiles of accruals quality index on the credit risk measures. To test the potential non-linearity between accruals quality and credit risk measures, this specification includes the AQ quartile indicator variables (i.e., AQ2 to AQ4). The sample is composed of 2,468 observations for public bonds during 2000–2010. See Appendix B for the variable definitions. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

TABLE 15

The Effect of Accruals Quality on Split Bond Ratings after Controlling for Alternative Explanations

Dependent Variable = *Split*

	Controlling for effects of investment		**Controlling for competition among rating agencies**	**Controlling for average bond ratings**	**Controlling for opacity**	**Controlling for innate factors of accruals quality**	**Controlling for non-linearity relation with ownership**
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AQINDEX	**0.188****	**0.180****	**0.128****	**0.089***	**0.129****	**0.117***	**0.137****
	(2.36)	**(2.41)**	**(2.13)**	**(1.68)**	**(2.11)**	**(1.86)**	**(2.22)**
Maturity	0.042	0.042	0.023	0.047	0.027	0.027	0.023
	(1.24)	(1.33)	(0.93)	(1.40)	(1.03)	(1.06)	(0.89)
Face value	-0.007*	-0.007**	-0.005	-0.005*	-0.005*	-0.005*	-0.004
	(-1.94)	(-2.05)	(-1.63)	(-1.75)	(-1.67)	(-1.83)	(-1.46)
Leverage	-0.163*	-0.142*	-0.146*	-0.145**	-0.101	-0.118*	-0.127*
	(-1.73)	(-1.73)	(-1.89)	(-2.13)	(-1.48)	(-1.67)	(-1.77)
Interest Coverage	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(-1.07)	(-1.10)	(-1.47)	(-0.22)	(-0.99)	(-1.29)	(-1.04)
б(*ROA*)	-0.723*	-0.746*	-0.550	-0.445	-0.528	-0.550	-0.574
	(-1.81)	(-1.89)	(-1.51)	(-1.30)	(-1.49)	(-1.55)	(-1.57)
Size	-0.013	-0.013	-0.012	0.002	-0.009	-0.008	-0.010
	(-1.38)	(-1.34)	(-1.60)	(0.19)	(-1.29)	(-1.11)	(-1.36)
ROA	-0.568**	-0.549**	-0.550**	-0.401**	-0.525**	-0.562**	-0.548**
	(-2.13)	(-2.44)	(-2.12)	(-1.97)	(-2.12)	(-2.06)	(-2.13)
Investment Grade	-0.014	-0.015	-0.009	0.028	-0.011	-0.010	-0.011
	(-0.48)	(-0.54)	(-0.38)	(1.03)	(-0.46)	(-0.42)	(-0.46)
Age	-0.010	-0.009	-0.015	-0.021**	-0.015	-0.015	-0.014
	(-0.72)	(-0.66)	(-1.49)	(-2.28)	(-1.45)	(-1.58)	(-1.46)
Listed	-0.082*	-0.086*	-0.049*	-0.045*	-0.055**	-0.050*	-0.033
	(-1.82)	(-1.76)	(-1.86)	(-1.87)	(-2.04)	(-1.88)	(-1.12)
Public Offering	-0.070*	-0.065	-0.060*	-0.046	-0.055	-0.056	-0.058
	(-1.71)	(-1.51)	(-1.70)	(-1.11)	(-1.44)	(-1.59)	(-1.64)
Loss	-0.001	-0.006	-0.002	-0.011	-0.005	0.000	-0.005
	(-0.03)	(-0.23)	(-0.08)	(-0.48)	(-0.22)	.	(-0.20)
Operating Cycle	-0.006	-0.006	-0.011	-0.018	-0.007	0.000	-0.010
	(-0.36)	(-0.34)	(-0.80)	(-1.16)	(-0.54)	.	(-0.77)
Owner	-0.230**	-0.245**	-0.164**	-0.147*	-0.153**	-0.174**	-0.424**
	(-2.41)	(-2.54)	(-2.22)	(-1.96)	(-1.97)	(-2.49)	(-2.15)
MTB	-0.004						
	(-1.30)						
NewEq		0.026					
		(1.13)					
NumRaters			0.036**				

			(2.40)				
Rating_avg				0.019**			
				(2.08)			
R&D					0.887		
					(1.12)		
б(*CFO*)						0.335	
						(1.34)	
б(*Sales*)						-0.004	
						(-0.15)	
(*Owner*)^2							0.356
							(1.52)
Intercept	0.378	0.367	0.367	-0.104	0.323	0.323	0.418*
	(1.13)	(1.14)	(1.53)	(-0.26)	(1.25)	(1.32)	(1.74)
Industry Effects	Included	Included	Included	Included	Included	Included	Included
Year Effects	Included	Included	Included	Included	Included	Included	Included
N	1,945	1,945	2,468	2,468	2,468	2,468	2,468
Adj. R^2	0.143	0.151	0.135	0.145	0.133	0.133	0.133

This table presents estimation results for the impact of accruals quality on split bond ratings (dependent variable) after controlling for potential correlated omitted variables. In regressions (1) and (2), I include *MTB* and *NewEq* to control for investment effects as reported by xxx. In regressions (3) and (4), I control for the level of competition among credit rating agencies (*NumRaters*) and for average bond rating (*Rating_avg*), respectively. In regression (5), I control for the degree of opacity using R&D expenses (*RD*). In regression (6), I include the innate components of accruals quality that are not already included as the control variables, which are б(*CFO*) and б(*Sales*). In regression (7), I control for the potential non-linear relation between split bond ratings and ownership by using a square of *Owner* ((*Owner*)^2). For regression models (1) and (2), the requirement for the variable, number of shares outstanding, reduces the number of observations to 1,945. The sample for models (3) – (7) is composed of 2,468 observations for public bonds during 2000–2010. See Appendix B for the variable definitions. All of the t-statistics (in parentheses) are based on standard errors clustered by firm. *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively, in two-tailed tests.

국문초록

발생액품질이 자본시장에 끼치는 영향에 대한 연구

본 학위 논문은 발생액품질이 자본시장에 끼치는 영향에 대한 두 편의 세부논문으로 구성되어있다. 두 편의 논문은 각각 주식의 신규공모(IPO)시장과 채권시장에 관한 것으로서, 첫 번째 논문은 발생액품질이 신규공모주의 초기저평가(Underpricing)에 어떤 영향을 미치는지를, 두 번째 논문은 발생액 품질이 국내 신용평가기관들이 발행하는 회사채 신용등급에 어떤 영향을 미치는지를 분석하였다.

본 논문에서 이용하고 있는 발생액 품질은 Dechow and Dichev (2002), McNichols (2002)와 Ball and Shivakumar (2006)의 방법론에 따른 것으로서 전기, 당기, 차기 영업현금흐름 외 여러 독립변수에 의해 설명되지 않는 발생액(위의 각 모델의 잔차)의 시계열 표준편차를 계산하여 측정된 것 들이다.

첫 번째 논문에서는 우선, 지속적으로 변화를 겪었던 규제환경 아래서 신규공모시장에서의 시장참여자들이 회계품질과 관련하여 어떤 인센티브를 가지는 지 그리고 시장은 이에 어떤 반응을 보이는 지에 대한 이론을 기반으로 발생액 품질이 신규공모시장의 초기저평가에 끼치는 영향에 대한 이론적인 모형을 설정한 후, 이 모형을 실제 자료를 통해 검증하는 실증 분석하는 단계를 거쳤다. 분석 기간을 시장조성제도기간, 풋백옵션기간과 시장조성제도폐지기간으로 나누어 실증분석한 결과, 공모주청약경쟁률, 상장시장상황, 공모주간사의 명성

등을 통제한 이후에도 시장조성제도폐지기간에는 발생액의 품질이 공모주 저평가와 음의 관계가 있음을 보여주었다. 이는 발생액의 품질이 낮을수록 투자자들과 상장기업들 사이의 정보비대칭이 심화되어 저평가현상이 더욱 심화되는 것을 의미한다. 하지만 시장조성제도와 풋백옵션이 실행되었던 기간 동안에는 이론모형에서의 예상과 같이 반대의 결과가 나타났다. 이러한 결과는 공모시장에서 주간사의 자율성을 저해하는 규제가 시장왜곡을 야기하였음을 시사한다. 아울러 이 결과는 발생액 품질과 저평가 간의 비선형 관계, 내생성 및 선택편의 등의 문제점들을 통제한 이후에도 동일하게 나타나 강건성을 확보하였다.

두 번째 논문의 목적은 발생액 품질이 우리나라 신용평가기관들이 발행하는 신용등급에 대한 불일치(Split bond rating)에 대해 어떤 영향을 미치는지를 규명하는 데에 있다. 실증분석결과 발생액 품질이 낮을수록 신용평가기관 간 신용평가등급이 상이하게 나타났다. 이러한 발견은 회사채발행기업의 발생액의 품질이 낮을수록 발행기업에 대한 회계정보가 불투명하여 신용평가기관들의 신용평가등급에 관한 불일치의 정도가 심화되는 것을 의미한다. 이 결과는 OLS 회귀분석뿐 아니라 Logit 회귀분석에서도 동일하게 나타났다. 또한 선택편의 문제점, 지배구조변수 및 추가적인 변수들을 통제한 이후에도 동일하게 나타나 강건성을 확보하였다.

종합하면, 본 학위논문은 발생액 품질이 시장참여자간의 정보불균형을 확대시켜 주식의 신규공모시장에서는 초기저평가를, 채권시장에서는 평가기관 간의 의견불일치를 확대시켜 회계품질의 저하가 결국 사회적인 비용으로 전가됨을 보여주었다는 점에서 의의가 크다 하겠

다. 본 연구의 결과는 규제기관이나 학계 및 실무종사자들과 투자자들에게 유용한 시사점을 제시하고 있다.

주요어: 발생액 품질, 신규공모시장, 저평가 현상, 시장조성제도, 풋백옵션제도, 신용등급의 불일치, 채권시장
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