An Empirical Study on the Stock Market Outcomes of Earnings Quality: Evidence from Japanese Manufacturing Firms

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Introduction and Overview

1.1 Introduction and Background

Earnings quality is of considerable interest to the participants in the financial reporting process including present and potential investors, creditors and lenders, preparers of financial reports, auditors and assurance providers, regulators and standard setters, analysts and financial press commentators. As a reflection of this bourgeoning interest, both analytical and empirical research on the proxies, determinants, and consequences of earnings quality have grown tremendously over the past two decades.[1] The major drivers for the dramatic surge in earnings quality literature are likely to be the confluence of several factors that have both encouraged and facilitated this line of research. These factors include regulators' harsh allegations of widespread earnings management among public companies, the introduction of the abnormal accrual models, the development and implementation of a set of internationally accepted accounting standards and the introduction of numerous new electronic data sets (DeFond, 2010). The importance of earnings quality research can also be justified by the ubiquitous nature of earnings and earnings-based metrics. Earnings have multitude of uses in various contexts. Earnings enter different valuation models and investment decision models as key inputs. Lower quality earnings can thus lead to poor decisions resulting in capital misallocations or wastage of scarce resources in the worst cases of fraud. Earnings also appear in different contractual arrangements such as in debt contracts or compensation contracts. Therefore, low quality of earnings can cause inordinate payouts to employees or can mask decaying credit quality from lenders. Against this backdrop, this thesis undertakes three empirical investigations to provide evidence on the stock market implications of earnings quality in the Japanese context. Japanese stock market has been selected as the subject of study because Japan has the second largest stock market in the world representing about 10% of the world's stock market capitalization (behind only the United States' 36% of global market capitalization). The capitalist economy has sophisticated equity markets and well-developed information dissemination systems, as well as widely-varying agency settings operating within common legal parameters (Landis et al., 2010). Yet, a careful search of

[1] Dechow et al. (2010) provide a comprehensive review of an emerging stream of literature covering the proxies, determinants and consequences of earnings quality.

the "top-ranked" accounting journals exposes the paucity of academic papers on the stock market implications of earnings quality conducted in the Japanese equity market.

A great deal of academic research on the market consequences of earnings quality has investigated the impact of earnings quality on various indicators of stock market outcomes such as the cost of capital, abnormal returns, idiosyncratic return volatility, market liquidity, information asymmetry, properties of analysts' earnings forecasts and others. This thesis examines the impact of earnings quality on three stock market outcomes for a broad cross-section of Japanese manufacturing firms for the period 2002-2012. The market outcomes considered for this thesis are the cost of equity capital, firm-specific return volatility, and information asymmetry. These outcome indicators have significant implications for the capital market participants for efficient allocation of resources in an economy. The cost of equity capital is considered as a summary indicator of investors' capital allocation decisions (Francis et al., 2004). The existence of a large volume of research dealing with the determinants of the cost of capital demonstrates the importance of this issue. Hence, the factors affecting the cost of capital are of utmost interest to accounting and finance researchers, corporate managers and policy makers. For example, understanding the determinants of the cost of capital is important to corporate managers because the cost of capital plays a significant role in corporate capital budgeting decisions that require selecting and investing in positive net present value (NPV) projects leading to shareholders' wealth maximization. Likewise, for investors, the cost of capital is necessary for equity valuation. Academic researchers require a reliable empirical proxy for the cost of equity capital when examining the effect of the variable of interest on firms' cost of equity capital (Botosan and Plumlee, 2005). On the macro level, lower cost of capital prompts greater investment, having a favorable impact on the economy as a whole. The firm-specific return volatility has important implications for (i) individual investors for making optimum portfolio diversification strategy; (ii) arbitrageurs who look for substitutes for mispriced stocks with lower idiosyncratic volatility; and (iii) executive compensation policies tied with stock options (Rajgopal and Venkatchalam, 2011). Moreover, a growing body of research suggests that idiosyncratic return volatility can explain some of the cross-sectional variation in stock returns in the sense that higher idiosyncratic risk stocks appear to have higher stock returns (Goyan and Santa-Clara, 2003; Fu, 2005). This line of research implies that firm-specific return volatility can affect the cost of capital. Information asymmetry is an important concept in accounting literature

because one of the fundamental roles of accounting disclosure is to reduce information asymmetry in the capital market. A large number of existing theoretical models addressed the impact of information asymmetry on the expected return demanded by the uninformed investors in response to their anticipated loss in a trade with better informed investors (Kyle, 1985; Glosten and Milgrom, 1985; Easely and O'Hara, 2004; Lambert et al., 2011; Lambert and Verrecchia, 2010). Amihud and Mendelson (1986), Easley et al. (2002), Armstrong et al. (2011) and Akins et al. (2012) empirically test the prediction of these theoretical studies, and find evidence of a significant relation between information asymmetry and the cost of capital. Furthermore, Bhattacharya et al. (2012) suggest an indirect path where earnings quality can affect the cost of capital mediated by information asymmetry. Information asymmetry among investors can also result in adverse private and social consequences including low investor participation, high transaction costs, thin markets and decreased gains from trade (Lev, 1989). Moreover, Francis et al. (2006) suggest that stock market perspective of earnings quality focuses on the capital allocation view of earnings quality. Therefore, demonstrating a link between earnings quality and market outcomes implies a fundamental economic role of accounting information and earnings-related information in particular in capital allocation decisions.

1.2 Research Objectives

The primary objective of this thesis is to examine the stock market outcomes of earnings quality in the Japanese equity market. To this end, this study selects three indicators of stock market outcomes and conducts three empirical investigations that relate earnings quality measures with those outcomes in order to explore whether earnings quality has any impact on those outcomes. The outcome indicators are the cost of equity capital, firm-specific return volatility, and information asymmetry among investors. These outcome indicators are selected for investigation because of their alleged role in the development of a transactionally and informaitonally efficient stock marke that can foster economic growth and enhance economic welfare through ensuring better allocation of scarce resources among competing units in the economy. In a broader sense, this thesis will complement our understanding of the role of earnings quality not only for the efficient allocation of resources but also for the well-functioning of capital markets in an economy.

Prior research on the consequences of earnings quality has identified two sources (innate versus discretionary) that can affect the quality of earnings of a given firm, and investigated their impact on various stock market outcomes such as cost of capital (Francis et al., 2005) and information asymmetry (Bhattacharya et al., 2013). Therefore, a secondary objective of this thesis is to distinguish earnings quality measure into two components (innate and discretionary) using the approach suggested by Francis et al. (2005), and investigate their differential effect on the selected outcome variables.

1.3 Research Questions

This thesis fits into a line of research which broadly examines the consequences of earnings quality. With above research objectives, the specific research questions addressed in this thesis include:

1. Does earnings quality affect the cost of equity capital?
2. Does earnings quality have any impact on firm-specific return volatility?
3. Does earnings quality influence information asymmetry among investors?
4. Does innate and discretionary components of earnings quality have differential effect on the cost of equity capital, firm-specific return volatility and information asymmetry among investors?

1.4 Motivation for the Research

The growing demand for research on earnings quality has drawn considerable attention of academic researchers in last two decades all over the world. While the study on the determinants and consequences of earnings quality has recently been the subject of enormous academic research in the United States, the number of research papers published in top-tier accounting journals on the issue of earnings quality and its impact on the capital markets in the Japanese context is very scant. The international cross-country studies on earnings quality expose the low quality of earnings in Japan compared to other developed countries (Leuz et al., 2003; Bhattacharya et al., 2003). On the determinants side, many studies have examined how different unique institutional characteristics such as *keiretsu* affiliation and cross-corporate shareholdings, various ownership categories, information intermediaries or accounting standard and disclosure affect the quality of earnings of Japanese firms. On the other hand, few studies have examined

the consequences of earnings quality. The lack of sufficient evidence on the stock market outcomes of earnings quality provides the impetus for conducting this research. So, this thesis will contribute to fill this gap in the earnings quality literature by providing evidence on the stock market consequences of earnings quality in the Japanese context.

Earnings quality is one of the most important characteristics of financial reporting systems. The concept of earnings quality is especially important in the context of capital markets. High-quality information is said to improve capital market efficiency. Therefore, investors, creditors and other users have a compelling interest in high-quality financial accounting information. Standard setters also try to develop high-quality accounting standards that will improve earnings quality, and regulators introduce frequent changes in financial reporting systems, corporate governance and enforcement intending to achieve a similar objective. Between 1999 and 2002, there were a number of significant changes to corporate financial reporting in Japan known as "Big-Bang Accounting Reforms." These changes essentially involved setting up western-style institutions such as Accounting Standards Board of Japan (ASBJ) that follows closely the model of Financial Accounting Standards Board (FASB) of the United States, and convergence of local accounting standards with International Financial Reporting Standards (IFRSs). As part of the convergence process, JASB issued new accounting standards that are in line with IFRSs. Prior to the issuance of new accounting standards, Japanese accounting standards were similar to German code law. Moreover, Japanese financial system was bank-dominated where banks and other financial institutions used to satisfy a significant portion of total funding requirements of the companies. In the bank-based financial system, the role of publicly available accounting information was limited because these banks had direct access to private information of their client firms. The adoption of big-bang accounting reforms reflects the transformation of the Japanese financial system from a bank-centered system to a market-centered system where the quality of financial reporting in general and the quality of reported earnings, in particular, emerge as a significant issue to the constituents of the financial reporting process. The gradual transition of Japanese financial system from traditional bank-based system to a capital market-based system provides an excellent setting to study the stock market outcomes of the quality of financial reporting in Japan.

1.5 Structure of the Thesis

The thesis consists of seven chapters. The introductory chapter gives an overview of the whole research including the background, research objectives, research questions and the motivation for the research. Chapter two provides a description of the significance of earnings for various decision-making purposes and the importance of earnings quality research. A discussion of the drivers of financial reporting and accounting information, the theoretical explanations for the prominence of earnings and related empirical evidences, the valuation versus contracting role of earnings and the reasons for renewed interest in earnings quality research by the users of financial information are main contents of this chapter. Chapter three delineates researchers' attempts to give precise definition of earnings quality, lists widely used proxies of earnings quality, explains the reasons for choosing accruals-based earnings quality proxies for this research and discusses about the components of earnings quality. Chapter four, five and six present the results from three empirical investigations. Chapter four deals with the cost of equity capital effect of earnings quality. Chapter five examines the relation between earnings quality and firm-specific return volatility. Chapter six examines the impact of earnings quality on information asymmetry among investors. A review of related theoretical and empirical literature along with development of testable hypotheses, research design issues including variable measurement and model specifications to test the hypotheses, sample selection procedure, and discussion of the empirical results are presented in each of chapter four, five and six. Chapter seven contains the conclusion of the study. First findings of the study are summarized and synthesized. The contributions and limitations of the study and scope for future research are then presented to conclude the study.

Chapter Two

Significance of Earnings and Earnings Quality Research

2.1 Introduction

The central theme of this thesis is to conduct an empirical study on the stock market outcomes of earnings quality in the Japanese setting. Before providing empirical evidence, it is important to know why earnings are of significant interest to wide range of users, and why research on earnings quality is especially important in the context of stock markets. The objective of this chapter is to give an overview of the drivers of financial accounting information, to provide theoretical explanations and empirical evidence in favor of the prominence of earnings information to financial reporting community, to explain the role of earnings and its implication in the capital market setting, and to highlight the importance of earnings quality research for efficient resource allocation in the economy.

2.2 Demand for Financial Reporting and Accounting Information

It is generally acknowledged that demand for financial reporting arises from the presence of information asymmetry and agency conflicts between managers and outside investors in the capital markets (Healy and Palepu, 2001). Information problem stemming from information asymmetry and incentive problems stemming from agency conflicts impede the efficient allocation of resources in the capital markets. Information asymmetry occurs because managers typically have better firm-specific information than investors about the value of investment opportunities of their business, but do not always disclose all value relevant information and tend to withhold unfavorable information that may be damaging to their personal interests. Managers often exploit this information advantage for extracting private gains at the expense of the general investors' welfare. Therefore, investors face an information problem when they make an investment in risky securities.[2] On the other hand, agency conflicts arise because of the separation of ownership from management in the public firms (Jensen and Meckling, 1976). The public firms are owned by the shareholders but managed and controlled by a group of specialized

[2]In a seminal paper, Akerlof (1970) explains this information or "lemons" problem using an example from a used car market in which half of the cars are good and half of them are bad (lemons). Since it is impossible for a buyer to distinguish a good car from a lemon, all cars must sell at the same price. Consequently, this prevents the seller of a good car from receiving a fair price of the car. At the extreme, good cars may be driven out of the market by lemons, because no seller has incentive to sell at the price set by the market.

professionals (commonly known as management) who are appointed by the owners and are entrusted to act on behalf of them. This separation between ownership and control creates a conflict of interest between firm's management and shareholders in that the interest of the management may not be consistent with the interest of the shareholders. The management makes most of the decisions on behalf of the shareholders but the decisions taken by the management do not necessarily coincide with the wishes of the shareholders. Thus, once investors have invested their funds in the firm, the self-interested managers may have incentives to make decisions that expropriate the investors' funds. For example, the managers may receive excessive compensation or make investment decisions that are detrimental to the investors but beneficial to the managers themselves. Therefore, mitigating information problem and agency problem is essential for facilitating capital formation process in the economy and ensuring efficient allocation of capital among most productive firms.

Healy and Palepu (2001) suggest a number of solutions both to the information problem and the agency problem. For example, optimal contracts between shareholders and managers may align the interests of the two parties, independent auditors can verify the accuracy of the reported numbers revealed to the capital markets, information intermediaries can produce more value relevant information for the investors, or financial intermediaries can assume active monitoring role in disciplining management. Regardless of the importance of the above-mentioned mechanisms, financial statements and accounting earnings, in particular, are viewed as the most important single source of information that can mitigate information problems and agency problems (Healy, 1996).

2.3 Importance of Earnings to Financial Reporting Community

Accounting earnings have transfixed both investors and managers over a long period. Earnings are ubiquitously used in reporting a company's operating performance and in conveying its value to the public. The announcement of annual and quarterly earnings is greeted with significant stock price movements suggesting that accounting earnings contain and reveal valuable information to the investors. Therefore, it seems to be natural that consumers of financial information will base their decisions on reported earnings figure, and managers of firms will eye on manipulating earnings to change the decisions of users in their favor.

2.3.1 Theoretical Explanations

Ronen and Yaari (2008) discuss three scholarly explanations that help understand the prominence of earnings to a large constituency of accounting information. The three explanations are: (i) the costly-contracting approach, (ii) the decision-usefulness approach, and (iii) the legal-political approach.

2.3.1.1 The Costly-contracting Approach

The costly-contracting approach defines the firm as a nexus of contracts made between the firm represented by management and outsiders, such as lenders, and between the firm represented by the board and insiders, such as management. Earnings are used in these contracts because they are explicitly and mutually observable. According to this approach, earnings are valuable in drafting a contract that is not complete and one of the parties to the contract behaves opportunistically. Practically it is impossible to design a truly complete contract since some future contingencies are unforeseen by boundedly rational parties to the contract. Hence, the contracts can be made partially complete by incorporating a flexible array of renegotiable options that reflect changing circumstances. Accounting numbers will lose importance if the contracts can be made optimally adjustable to the changing circumstances. So the fact that contracts are not complete is not in itself sufficient to render accounting numbers valuable because contracting parties could constantly revise the contract. Even when contracts are optimally adjustable to the changing economic circumstances, the adjustment may be costly, or the contracting parties may not be willing to do so because of opportunistic behavior. In addition to the incompleteness of the contract, if the parties to the contract behave opportunistically, then one of them might refuse to adjust the contract. Thus, the combination of incompleteness and opportunism renders contracts imperfectly adjustable to changing economic circumstances and lends importance to accounting numbers (Ronen and Yaari, 2008).

2.3.1.2 The Decision-usefulness Approach

A firm is a social unit of individuals who join, cooperate and participate in the activities of the firm to achieve a collective goal. These participating individuals are called decision makers. Decision makers are rational human beings who are driven by self-interest maximization behavior. Consequently, they will work for the well-functioning of the organization as long as

they find their individual interest being achieved. The decision-usefulness approach, which is derived from game theory, focuses on a single decision maker. One important assumption of decision-usefulness approach is that each decision maker is rational in that he chooses those actions that maximize his expected utility. An action (decision) is optimal if it maximizes his expected utility, when he has to select a decision from a range of feasible actions (decisions), knowing that the combination of his action (decision) and the actions (decisions) of other pertinent decision makers will determine his share of the social outcome. Thus, a decision maker's share in the social outcome depends in part on the actions (decisions) taken by other decision makers. The emphasis on optimal decisions implies that any accounting number is valuable if it conveys useful information to all decision makers for their respective decision making. Under this approach, decision makers are not fully informed, and earnings are important to them because they believe that earnings provide relevant information that is useful for making decisions. Conversely, an accounting signal that does not reveal any incremental information is not useful for decision making (Ronen and Yaari, 2008).

2.3.1.3 The Legal-political Approach

The legal-political approach also views the firm as a nexus of contracts, but contracts with all stakeholders are not equally important. The contract between management and shareholders is given priority over contracts with other stakeholders. This approach recognizes the conflict of interests between managers and shareholders. Management takes actions to manage the firm's resources and assets to generate a stream of cash flows or earnings, but they do not possess the right to these cash flows or earnings. The right to cash flows or earnings belongs to shareholders who hold the common stock but as a residual claimant, they are not guaranteed any cash. Both parties pursue their respective self-interest, and there is no a priori guarantee that their interests will be aligned. Under this approach, not only the existence of a conflict of interests but also the lack of power of shareholders over decisions that affect their share of the firm lends importance to accounting information. Hence, two features of manager-shareholders situation prevent the shareholders from maximizing their welfare. One is poor governance, and the other is information. That is, shareholders need information to monitor management and the board with the limited tools in their possession. Earnings are summary numbers that convey valuable information about the operation of the firms. Shareholders can

learn valuable information from these summary numbers without knowing detail operations of the firm, a process that might be too costly and cumbersome and might run the risk of exposing proprietary information to the competitors (Ronen and Yaari, 2008).

To summarize, the aforementioned theoretical perspectives explain why earnings are the most useful information for all the constituencies associated with accounting and financial reporting. The costly-contracting approach holds that earnings are essential for designing efficient contracts when the contracts are far from complete regarding specifying future contingencies. The decision-usefulness approach states that earnings provide valuable information to decision makers for respective decision making. The legal-political approach assumes that shareholders have neither knowledge nor power to monitor and control managers effectively. So earnings are valuable measure that summarizes a firm's activities and allow shareholders to make effective use of their limited tools.

2.3.2 Empirical Evidence

Earnings are at the core of the financial reporting process and receive utmost prominence by a wide range of users since earnings numbers are used as a summary measure of firm performance in various contexts such as in firm valuation, in executive compensation contracts or in debt covenants. It is well-known that accounting earnings are cash flows generated from the operations of the firm, adjusted by accruals. Academic finance literature prioritizes cash flows over accounting earnings as a measure of firm performance. Cash flows are assumed to be relatively objective measure of firm performance because cash flows are free from subjective judgment that managers can apply over accruals. In contrast, the proponents of earnings as a better measure of firm performance argue that cash flows are subject to periodic fluctuations, and accruals are introduced to smooth these fluctuations. Accruals shift or adjust recognition of cash flows over time to make financial statements more revealing about the real economic performance of the firm (Dechow, 1994; Dechow et al., 1998). Thus, the accrual adjustment process enables earnings to be a better indicator of performance than cash flows. Another reason for the importance of accounting earnings is that earnings reflect cash flows forecasts and are highly correlated with firm value (Dechow, 1994). This ability of earnings to reflect future cash flows makes earnings a better proxy for future cash flows than current cash flows. Therefore, Dechow et al. (1998) state that earnings are repeatedly used as performance measures in

contractual arrangements and as input to the equity valuation models. Empirical research has examined whether earnings or cash flows better measure firm's performance. An assumption underlying this stream research is that stock prices accurately reflect the economic income of a firm. Early research focused on the information content of the accruals and cash flows. In a phenomenal work, Ball and Brown (1968) find that earnings are highly associated with stock returns than are operating cash flows. Since accruals are the difference between earnings and cash flows, this result suggests that accruals improve the ability of accounting earnings to reflect firm performance. In a similar vein, Wilson (1986, 1987), Rayburn (1986), Bowen et al. (1986), Bernard and Stober (1989) and Livnat and Zarowin (1990) report that the accruals and cash flows components of earnings have information content.

These studies do not directly examine the superiority of earnings over cash flows as a summary measure of firm performance. Dechow (1994) compares the strength of association between stock returns and earnings versus stock returns and cash flows over different measurement intervals to formally establish that earnings are superior to cash flows as a summary measure of firm performance. Results show that earnings have a stronger association with stock returns than net cash flows or cash flows from operations over short measurement intervals (i.e. quarterly). The explanatory power of realized cash flows relative to earnings will increase as the measurement interval is increased from a quarterly interval to an annual interval and a four year period, respectively. However, earnings are more strongly associated with stock returns than either cash flows measure over each measurement interval. Based on this evidence, Dechow (1994) concludes that earnings are better measure of firm's financial performance. Similarly, Lev and Zaworin (1999) find that stock prices react more strongly to reported net income as compared to operating cash flows, which means that investors appreciate earnings as a performance indicator more than cash flows. Penman and Sougiannis (1998) find that forecast errors are smaller in valuation models when earnings are used instead of cash flows. Dechow and Schrand (2004) note that accruals, if used appropriately, improve the decision usefulness of earnings by lessening value-irrelevant fluctuations in underlying cash flows. Dechow and Skinner (2000) contend that accruals tend to reduce the temporal variation of cash flows, and thus produce a more useful earnings number than cash flows of the current period.

Earnings have significant relevance to the internal decision-makers and the producers of financial reports also. In a comprehensive survey of the CFOs conducted by Graham et al. (2005),

an overwhelming majority (51%) of the CFOs state that earnings, not cash flows, are the most important financial metric considered by the external constituents. This finding suggests that accounting earnings are more important to the managers for financial reporting purposes than cash flows because earnings may have superior informational content about firm value than do cash flows.[3] The interviews of the CFOs have highlighted several reasons for their exclusive focus on earnings such as investors' need for a simple and easily understandable financial metric that summarizes firm performance, extensive media coverage and dissemination of earnings news by the financial press, or sophisticated users' (financial analysts, institutional investors) reliance on earnings for assessing firm performance and predicting future value. CFOs also believe that meeting or beating earnings benchmarks is crucial because hitting earnings benchmarks provides credible signal to the market, helps to maximize their firm's stock prices, influences their own welfare through career concerns and external reputation, and contributes to avoid severe stock market reaction associated with failing to meet or exceed earnings expectations (Graham et al., 2005).

2.4 The Role of Earnings: Valuation or Stewardship

As the most widely used accounting information, earnings perform dual roles: informativeness role and stewardship role (Ronen and Yaari, 2008). The informativeness role of earnings arises from the fact that investors demand relevant and reliable information about future expected cash flows and the risk associated with those cash flows. One way to evaluate the informativeness role of earnings is to examine the relationship between reported earnings and stock prices. For example, Francis et al. (2003) find that earnings are more closely associated with stock prices, and earnings have more information content than cash flows, sales, and other financial statements' elements. However, the recent evidence on the preference of street earnings over GAAP earnings and the decreasing association between earnings and stock prices raises question about the informativeness of earnings. On the other hand, the stewardship role of earnings lies in the agency relationship where managers act as agents (steward) of the principals (shareholders). The agency relationship predicts that managers, being self-interest maximizing

[3] The importance of earnings to CFOs is affected by certain firm characteristics. For example, earnings are relatively less important to the CFOs of unprofitable, younger and financially distressed firms, firms for which translation of economic events into earnings is slow, or firms operating in high-tech industries (Graham et al., 2005).

individuals, may act in a manner that is inconsistent with the expectation of the shareholders. This possibility will motivate the shareholders to demand information to monitor the performance of the manager and to provide managers with incentives that align managers' interests with their own. As Watts and Zimmerman (1978, p. 113) state, "One function of financial reporting is to constrain management to act in the shareholders' interest." Earnings are used by the shareholders to monitor managers and to design incentive contracts that are expected to ensure goal congruence between owners and managers. However, the increase in equity-based compensation and decrease in the relative weight of earnings in managers' incentive package cast doubt on the efficacy of the stewardship role of earnings.

There is a long-standing theoretical debate in accounting research about whether earnings are more useful for valuation purpose (Barth et al., 2001) or for stewardship and contracting purposes (Holthausen and Watts, 2001). These different perspectives on the role of earnings have practical implications for what is meant by earnings quality or what constitutes high-quality earnings. For example, earnings consisting of more persistent and less transitory or reversible components are considered "high-quality earnings" for valuation purpose but not for contracting purpose (Christensen et al., 2005). The survey by Dichev et al. (2013) of CFOs from public companies provides evidence on the relative prominence of the valuation role of earnings versus contracting role of earnings from the perspective of the producers of earnings quality. The responses of the CFOs, when asked about how earnings are used by the interested parties, indicate that the valuation role of earnings dominates with nearly 95% of the CFOs state that earnings are very important to the investors for valuation of stocks. However, the survey also finds that earnings are important for four other uses, which can be placed in the stewardship/contracting/control role of earnings. Specifically, the survey finds support for the importance of earnings (i) for use in debt contracts (82.1%); (ii) for internal use by the firm's own executives (80.5%); (iii) for use in executive compensation contracts (78.7%); and (iv) for use by outsiders in evaluating company's managers (62.7%).

This thesis assumes stock market perspective as opposed to contracting perspective and examines how earnings quality influences stock market outcomes. In the stock market setting, *ex-ante* resource allocation decision is seen as fundamental to *ex-post* evaluation of contractual outcomes or assessment of stewardship. Francis et al. (2006) suggest that stock market use of earnings information for capital allocation decisions is fundamental since it provides a basis for

other uses, such as stewardship and thus, prioritizes the informativeness/valuation role of earnings in the capital market setting. They also argue that whether and to what extent earnings quality affects resource allocation decisions help understand why and how earnings information is helpful for investors and others including those charged with stewardship responsibilities. Since I investigate the stock market consequences of earnings quality in this thesis, I focus on the valuation role of earnings and capital allocation view of earnings quality as opposed to contracting view.

2.5 Why Research on Earnings Quality Is of Interest

Financial reporting is introduced as a useful device for mitigating information problem and incentive problem in the capital market. It is instrumental in reducing information asymmetry between management and external stakeholders by providing timely and reliable information. It is also commonly used in the contracting process of the firm with third parties, including executives, lenders, and suppliers. Hence, the quality of earnings is an essential aspect when concerned parties make decisions that are entirely or at least in part, based on earnings number (Dechow et al., 2010).

There has been a tremendous growth in earnings quality research over the last two decades. DeFond (2010) identifies several factors that have spurred and facilitated this line of research such as regulators' harsh criticism of widespread earnings management, many instances of high-profile accounting scandals leading to the collapse of corporate giants, introduction of the abnormal accruals models and other proxies of earnings quality, the development and implementation of a set of "high-quality" international accounting standards, and easy accessibility to required data provided by new electronic databases.

The concept of "earnings quality" is at the heart of the accounting and financial reporting. An important objective of financial statements is to reflect the underlying reality of the firm and to provide information that effectively aids users in making decisions. Among all financial statement items, earnings are the single most commonly used financial information for multifarious purposes. Thus, lower quality earnings information will not serve its intended purposes and will lead to wrong decisions. Consequently, the ability to objectively determine the earnings quality of firms, to identify the factors influencing the quality of reported earnings, and

to assess the impact of earnings quality on stock market indicator has become a vital part of financial accounting research.

Schipper and Vincent (2003) discuss the importance of earnings quality from decision usefulness perspective adopted by the FASB and by academic scholars. They state that the issue of earnings quality is of significant interest to those who use financial information provided by financial reports for investment decision making or for contracting purposes. They also believe that standard setters have considerable interest in the quality of reported earnings because earnings quality or more generally financial reporting quality is viewed as an indirect indicator of the quality of financial reporting standards.

Earnings quality is extremely important for the investors who are contemplating to make a fresh investment of their valuable resources in the stock market or to dispose of their existing investment. Investors are only willing to invest their accumulated fund in any firm if the expected return on the investment matches the risk involved in that security. To evaluate the profitability and riskiness of potential investment opportunities, investors need information about the expected future earnings or cash flows and the associated risks. Managers of firms supply financial information including current and past earnings to the present and potential investors in the capital markets with a view to attracting capital investments for their firms. With these invested funds, managers then finance the risky projects that the firms undertake in order to maximize shareholder value. Hence, earnings information steers resource allocation decisions, and high-quality earnings are desired from an investment perspective because it facilitates efficient allocation of resources in the economy. Schipper and Vincent (2003) summarize the adverse consequences of low-quality earnings on capital allocation in the following words:

"Low-quality earnings are inefficient because they reduce economic growth by causing capital to be misallocated. In the limit, earnings of such low quality as to be fraudulent are objectionable because they divert resources from substantive projects with actual expected payoffs to chimerical projects with imaginary expected payoffs."

As earnings and earnings-based metrics enter into contractual agreements such as in compensation agreements and in debt agreements as dominating or restrictive criteria, contracting decisions based on low-quality or poor earnings may induce unintended wealth transfers. For example, when earnings are used as a performance measure in the compensation contracts in which incentives are directly linked with performance, artificially inflated earnings

will result in overcompensation to managers. Similarly, overstated earnings might hide deteriorating creditworthiness, leading lenders mistakenly to continue lending or to defer foreclosure (Schipper and Vincent, 2003). An opposite view is also prevalent in the literature. For example, Christensen et al. (2002) show that earnings management can improve contracting efficiency. Christensen et al. (2005) analyze the contracting implication of different properties of accounting earnings and its components (persistence and autocorrelation structure), and show that the stochastic characteristics of the various components of accounting earnings have different effects on the value of accounting earnings as a performance measure in incentive contracting relative to the use of accounting earnings for valuation purpose. For example, while improving "earnings quality" by increasing persistent component, reducing reversible component, eliminating transitory component or reducing accrual estimation errors may be helpful for equity valuation, it may not be equally helpful for incentive contracting. This line of research suggests that earnings quality has differential implications for incentive contracts, and to the contracting parties who attempt to design an optimal and efficient contract.

There are practical difficulties in identifying and measuring overall indicators of financial reporting quality. As practitioners and users view earnings as a prominent outcome of the financial reporting process, many researchers focus on earnings quality to summarize financial reporting quality since earnings are easier to observe and measure. However, the exclusive focus on earnings quality as a summary indicator of financial reporting quality has some limitations. For example, earnings number masks the differences in the properties of various line items, which are aggregated into a single bottom line number. The capital market implications of these line items are expected to vary depending on particular decision context. In addition, earnings do not capture balance sheet information, which may have different properties and decision usefulness (Francis et al., 2006). Despite these limitations, the focus on the quality of earnings number seems to be appropriate because earnings number is believed to be the most important outcome indicator of financial reporting process by the researchers. In the same token, accounting standard setters tend to focus on the outputs of the financial reporting process, including the quality of reported earnings, when they seek feedback from financial reporting community in order to appraise the effectiveness of the standards they promulgate (Schipper and Vincent, 2003).

Many research questions in accounting and finance explicitly or implicitly are associated with the idea of earnings quality. For example, the seminal work by Ball and Brown (1968) evaluates the relevance of accounting income number. Sloan (1996) evaluates differential persistence of various earnings components. Barth et al. (2008) examine the role of accounting standards in influencing the usability of financial reporting. Francis et al. (2004, 2005) examine the impact of earnings quality on the firms' access to capital. This line of research on earnings quality is especially important because higher quality earnings should be more useful to a wide range of users, and assist them in their resource allocation decisions or contracting purposes. Therefore, it is of significant interest to the firms, investors, creditors, standard setters, and regulators to seek for continuous improvement in earnings quality.

2.6 Conclusion

This chapter gives an overview of the significance of earnings in various decision contexts and highlights the importance of earnings quality research. At first, it is identified that the presence of information asymmetry and the separation between ownership and control gives rise to information problem and incentive problem, which impede the efficient allocation of resources in the capital markets. Among various mechanisms used to mitigate information problem and agency problem, financial accounting information and accounting earnings, in particular, are mostly valued by the investor. Then, three scholarly explanations are discussed to highlight the prominence of earnings to financial reporting community. According to the costly-contracting approach, earnings are important for designing efficient contracts if the contracts are incomplete, and the parties to the contract behave opportunistically. The decision-usefulness approach holds that earnings number reveals valuable information to decision makers for making investment, credit and other decisions. The legal-political approach suggests that earnings number is a valuable measure that summarizes a firm's activities and allows shareholders to make effective use of their limited tools. These theoretical explanations are supported by empirical evidence showing that earnings are more informative about firm performance than cash flows (Dechow, 1994), earnings are better predictor of future cash flows than current cash flows (Barth et al., 2001), earnings are repeatedly used in valuation models as performance measures (Dechow et al., 1998) and earnings are significantly associated with stock returns (Ball and Brown, 1968; Dechow, 1994). Survey results also indicate that managers view earnings as

the key metric evaluated by investors and analysts (Graham et al., 2005). The chapter then discusses the valuation and stewardship role of earnings. The valuation role of earnings emphasizes that investors require relevant and reliable information about future expected cash flows and the risk associated with those cash flows for security valuation purpose while the stewardship role of earnings recognizes that shareholders demand information to monitor the performance of the manager. While there is a debate about the role of earnings, a survey of CFOs indicates that valuation role of earnings dominates stewardship role (Graham et al., 2005). Last of all, the chapter discusses why earnings quality research is of significant interest from both investment and contracting perspective.

Chapter Three
Earnings Quality and Its Components

3.1 Introduction

This chapter deals with different perspectives on the definition of earnings quality, lists a large number of empirical metrics available in the literature to proxy for earnings quality, explains the rationale for selecting accruals-based earnings quality measures for the purpose of this study, and discusses components of earnings quality.

3.2 Definition of Earnings Quality

Surprisingly, the concept of earnings quality remains largely elusive, and a fast growing literature on earnings quality has failed to reach a consensus on the definition of earnings quality. As a result, there is no agreed upon definition of earnings quality in the literature although researchers have taken several attempts to provide a theoretical underpinning and to define and measure earnings quality more precisely. For example, Schipper and Vincent (2003) relate earnings quality with the theory of economic income. Dechow and Schrand (2004) assume that high-quality earnings reflect current performance and indicate future performance of a firm. Francis et al. (2006) define earnings quality as how precise reported earnings are with respect to a valuation-relevant construct. Dechow et al. (2010) suggest that higher quality earnings provide more information about a firm's fundamental earnings process. Standard setting bodies such as the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) jointly develop a common conceptual framework that highlights the need for high-quality financial reporting. Although the joint conceptual framework does not define quality precisely, it mentions that accounting information should possess some qualitative characteristics such as faithful representation, comparability, verifiability, timeliness, and understandability in order to achieve a higher quality (Ewert and Wagenhofer, 2011).

Many researchers have used the notion of decision-usefulness as an indicator of high-quality earnings. Schipper and Vincent (2003) consider earnings quality from a decision-usefulness perspective, following the Financial Accounting Standards Board's (FASB) conceptual framework. The conceptual framework provides general guidelines for high-quality financial reporting. The main purpose of financial statements is to provide information that is

useful for making decisions, following the intuition that financial reporting should effectively help users take informed decisions. As a result, earnings information which actually aids in decision making is considered to be of high quality. Their focus on decision-usefulness perspective is motivated by the following two reasons. Firstly, the FASB has shifted its focus from stewardship function of accounting to decision-usefulness perspective of accounting numbers in the conceptual framework. According to Concept Statement No. 1 (para. 34 and following), the primary purpose of financial reporting is to disseminate useful information for business decision making, and Concept Statement No. 2 (paras. 30 and 32) accentuates decision-usefulness as overruling criteria for judging accounting choices. Secondly, decision-usefulness is empirically tractable and commonly used in accounting research. However, since there are myriad of users and uses (i.e., decision-makers and decisions) of earnings information, earnings quality from decision-usefulness perspective is heavily context-dependent. As a result, the assessment of decision-usefulness of earnings requires choosing a decision context and making specific assumptions about the decision makers and their uses of earnings number in that context. The conclusions then are conditional on the context chosen (Schipper and Vincent, 2003). The concept of earnings quality from decision-usefulness perspective carries different meaning to different financial statement users. Regulators view earnings to be of high quality when earnings are measured in conformance with the spirit and rules identified in generally accepted accounting principles (GAAP). To the creditors, high-quality earnings are those that can be easily and rapidly converted into cash flows. To the compensation committees, high-quality earnings reflect managers' real performance and are little influenced by the factors beyond management control (Dechow and Schrand, 2004).

Shipper and Vincent (2003) complement this context-specific decision-usefulness perspective on earnings quality with the context-neutral perspective of economic income. They relate "earnings quality" to the economic-based definition of earnings developed by Hicks (1939).[4] They define earnings quality as "the extent to which reported earnings faithfully represent Hicksian income, where representational faithfulness means "correspondence or

[4] Hicksian income refers to the amount that can be consumed (that is, distributed to the shareholders as dividends) during a period, while leaving the firm equally well-off at the beginning and the end of the period. Hicksian income corresponds to the change in net economic assets resulting from transactions other than those with owners (Schipper and Vincent, 2003). This measure of income is tantamount to the newly introduced concept of "comprehensive income".

agreement between a measure or description and the phenomenon that it purports to represent" (FASB Concepts Statement No. 2, para. 63)". This definition embraces the idea that reported earnings will be of higher quality if reported earnings closely resemble economic earnings of which Hicksian income is an example. Focusing on Hicksian income is appropriate as Shipper and Vincent (2003) argue that "It abstracts from user-decision contexts; from accounting recognition rules, which preclude the recording of many economic assets and liabilities; from difficulties in reliably measuring assets and liabilities at their economic values; from the effects of management's judgments and estimates; and from the influence of auditors. The construct thus allows us to consider what reported earnings would look like in the absence of financial reporting rules and their implementation." However, there are some practical difficulties of Hicksian income construct limiting its applicability. The exact measurement of Hicksian income and thus, the quantification of discrepancy between accounting income and Hicksian income are not possible because Hicksian income is empirically non-operational. Moreover, accounting recognition and measurement rules coupled with preparers' implementation choices will not render reported earnings to measure Hicksian income. There are some approximate measures of Hicksian income available in the economic literature. The quality of accounting earnings can be judged by considering how closely reported earnings match with those approximations of Hicksian income (Schipper and Vincent, 2003).

Dechow and Schrand (2004) suggest that a high-quality earnings number should have three attributes: first, the reported earnings number should reflect current performance; second, it should be a good indicator of future operating performance; and, third, accurately annuitize the intrinsic value of the company. Thus, they analyze earnings quality from financial analysis perspective, and incorporate equity valuation perspective in the concept of earnings quality, highlighting analysts as very important users. This definition of high-quality earnings is closely related to Levitt (1998)'s concept of meaningful disclosure. Levitt (1998) says that managers should tell the investors the story of 'where the company has been, where it is and where it will be going' by providing high-quality disclosure. A high-quality earnings number does the same story-telling as mentioned by Levitt (1998) by giving users the flexibility with which they can evaluate the past and current operating performance, predict future operating performance and assess the intrinsic value of the firms.

Francis et al. (2006) focus on capital market setting, as opposed to a contracting or stewardship setting, to lay out a research perspective on earnings quality because they view capital market uses of accounting information as fundamental in the sense of providing a basis for other uses. They associate earnings quality with a statistical notion, precision (that is, low variance), in the sense that higher quality earnings are more precise with respect to an underlying valuation-relevant construct that earnings are intended to describe. Despite their chosen focus on precision, they acknowledge that other attributes of earnings also contribute to the quality of earnings such as timeliness and unbiasedness. Francis et al.'s (2006) perspective of earnings quality complements that taken by Dechow and Schrand (2004) in that precise earnings would correspond to permanent earnings, and that taken by Schipper and Vincent (2003) in that precise earnings would represent a change in net wealth.

Dechow et al. (2010) define earnings quality as "Higher quality earnings provide more information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision-maker." They also indicate three features of this definition of earnings quality. First, earning quality is decision-specific, i.e., it can be defined in the context of a specific decision model used by a specific decision maker. Second, higher quality earnings are informative about the firm's unobservable financial performance. Third, earnings quality depends on both the firm's fundamental earnings process and the accounting system that measure earnings. Thus, this definition of earnings quality embraces the idea that higher quality earnings should be informative of the features of a firm's financial performances that are relevant to any decision taken by the users of financial statements.

In addition to aforesaid attempts to define earnings quality, academics and practitioners have thought of earnings quality in a number of different ways. For example, high-quality earnings are described as those that are persistent and sustainable predictor of future earnings (Penman and Zhang, 2002; Melumad and Nissim, 2009), are smooth (Francis et al., 2004), are closer to cash flows or contain small amount of accruals (Visvanathan, 2006), result from applying conservative rules (Watts, 2003a, 2003b), are value relevant (Francis and Schipper, 1999), recognize losses more timely than gains (Basu, 1997; Beaver and Ryan, 2005), exhibit less earnings management (Barth et al., 2008), do not have special or non-recurring items (Dechow and Schrand, 2004; McVay, 2006), contain less accrual estimation errors and backed by past, present and future cash flows (Dechow and Dichev, 2002), have small changes in total

accruals orthogonal to firm fundamentals (DeAngelo, 1986; Jones, 1991; Dechow et al., 1995; Kothari et al., 2005).

Dichev et al. (2013) conducted a large survey and a dozen of in-depth interviews with top financial executives of public companies to elicit their views on the concept of earnings quality and other related aspects. From CFOs' responses, the sustainability notion of earnings quality emerges as a dominant theme, that is, they believe that higher quality earnings are sustainable and repeatable. CFOs specify some qualitative factors that affect earnings sustainability including consistent reporting choices over time, earnings backed by actual cash flows, and absence of one-off items and long-term accounting estimates. This view of earnings quality is consistent with the valuation function of earnings, where investors view the firm as a long-term stream of earnings and cash flows. Consistent with this view, current earnings are considered to be high quality if they serve as a good guide to the long-run profits of the firm. Interestingly earnings sustainability is also a desirable characteristic in credit decisions and managerial evaluation. Thus, contrary to the Dechow et al. (2010)'s idea that the concept and measures of earnings quality are strongly conditional on the specific decision setting, CFOs view earnings quality as a distinct and context-free characteristic (Dichev et al., 2013).

It can thus be summarized from above discussion that earnings quality is essentially a context-specific construct (with few exceptions as mentioned above), partly because the users, to whom the definition is targeted, differ from situation to situation (Dechow et al., 2010; Schipper and Vincent, 2003). Thus, investors, creditors, standard setters, and managers with compensation contracts tied to earnings may have divergent perceptions of earnings quality conditional on their decision context.

3.3 Earnings Quality Proxies

Earnings quality is a multidimensional concept and thus there is no single agreed-upon measure of earnings quality that is suitable for all decision models. The empirical literature has developed a large number of metrics to proxy for earnings quality. Because each of them captures only certain aspects of the financial reporting process, there is no single best measure of earnings quality and the metrics should not be seen as substitutes (Dechow et al., 2010). Many studies have split commonly used proxies of earnings quality into different groups. Dechow et al. (2010) classify earnings quality proxies available in the literature into three broad categories:

first category, proxies based on the properties of earnings, includes earnings persistence, total accruals and abnormal accruals, earnings smoothness, asymmetric timeliness and timely loss recognition, and target beating; second category, investor responsiveness to earnings, includes an earnings response coefficient (ERC) or the R^2 from the earnings-returns model, and relation of ERC to another construct such as auditor quality; third category, external indicators of errors or earnings misstatements, includes firms subject to SEC enforcements, restatements, and internal control weaknesses. Francis et al. (2004) identify seven attributes of earnings (measures of earnings quality) that have been widely used in academic earnings quality research, and characterize these attributes as either "accounting-based" or "market-based" depending on the underlying assumptions about the intended function of earnings. The "accounting-based" earnings quality measures include accruals quality, earnings persistence, predictability, and smoothness. These measures assume that the function of accounting earnings is to allocate cash flows over the reporting periods using accruals, and thus, take earnings or its components such as cash flows or accruals as a reference construct. On the other hand, the "market-based" earnings quality measures include value relevance, timeliness, and conservatism. These measures assume that the function of earnings is to capture economic income as manifested in stock returns, and therefore, use stock price or return as the reference construct. Schipper and Vincent (2003) group earnings quality constructs that have been used in accounting research into four classes: (1) earnings quality constructs derived from the time-series properties of earnings such as persistence, predictive ability, and variability; (2) earnings quality measures based on the selective qualitative concepts in the FASB's conceptual framework such as relevance, reliability, and comparability; (3) earnings quality measures that rely on the relations among earnings, cash flows and accruals such as ratio of cash from operations to income, changes in total accrual, abnormal accruals and accruals-to-cash relations; (4) earnings quality derived from management implementation decisions such as required or subversive estimates and judgment taken as inverse measure of earnings quality. They also highlight that some earnings quality constructs depend on accounting measurement system as well as underlying events and transactions (e.g., earnings predictability is significantly hampered by some business models) while some earnings quality constructs are primarily reporting phenomenon (e.g., earnings smoothness or abnormal accruals depend primarily on accounting treatments).

3.4 Reasons for Choosing Accruals-based Earnings Quality Measures

Accruals play an important role in shifting or adjusting the recognition of cash flows over time so that the adjusted numbers better measure firm performance (Dechow and Dichev, 2002). Accruals enhance the usefulness of earnings to capture economic performance of the firms when it occurs by mitigating timing and mismatching problems associated with cash flows as a measure of firm performance. Thus, the quality of accruals is commonly used as an indicator of earnings quality. It is generally recognized that higher quality accruals translate into higher quality earnings. However, estimation errors in accruals, reversible nature of accruals, and discretionary use of accruals deteriorate the quality of accruals and earnings. Considering the central role of accruals in earnings determination process and the overriding impact of accruals on various earnings attributes, as discussed below, I choose to use accruals-based measures of earnings quality. To be specific, I use Dechow and Dichev (2002)'s accrual quality model and Kasznik (1999) version of the modified Jones (1991) abnormal accruals model to derive measures of earnings quality. Dechow and Dichev (2002) focus on the matching function of accruals to cash flows and measure quality of accruals in terms of estimation errors in accruals. The general view is that the quality of accruals decreases as the variance of estimation errors increases. The abnormal accruals models divide total accruals into normal accruals associated with firm's fundamental performance and abnormal accruals resulting from accounting distortions or earnings management. The general impression is that a high level of abnormal accruals indicates low quality of accruals and earnings. Furthermore, accruals-based measures of earnings quality directly capture the problems associated with accounting measurement rules and so are pertinent to accounting researchers (Dechow et al., 2010).

3.4.1 Role of Accruals in the Determination of Earnings

The primary function of accruals is to mitigate problems with measuring firm performance. Realized cash flows are a 'noisy' measure of firm performance because of timing and matching problem. Therefore, accruals are used to alter the timing of cash flows recognition in earnings to mitigate the noise in cash flows (Dechow, 1994). The importance of accruals in the financial reporting process can also be viewed from the perspective of its ability to predict future earnings or cash flows. An important objective of financial reporting is to assist the users in predicting future earnings or cash flows, which are regarded as the primary valuation construct

used by the investors to assess firm's value. Prior research examining the predictive ability of earnings with respect to future cash flows has found that earnings are better predictor of future operating cash flows than current operating cash flows (Dechow et al., 1998). Further, Barth et al. (2001) find that current earnings when disaggregated into the cash flows and the accrual components have significantly more predictive ability for future cash flows than current and several lags of aggregate earnings. Investors should, therefore, have a considerable interest in earnings and its components - accruals and cash flows. As the breakdown of earnings into accruals and cash flows improves the predictive ability of earnings, and given the fact that management discretionary judgment affects the accruals mostly rather than cash flows, the quality of accruals should be an important measure of earnings quality for the investors. Thus, the quality of accruals represents an important measure of earnings quality.

3.4.2 Role of Accruals in Assessing Earnings Quality

Under the accrual accounting system, reported earnings consist of two elements - cash flows and accruals. Accruals are used to adjust cash flows to arrive at earnings number. At different phases of the financial reporting process, managers need to exercise judgment to determine the magnitude of accruals. For example, management is required to apply judgment to estimate future economic activity, to select appropriate accounting methods from a given set of available alternatives, to determine the level of working capital, to decide expensing versus capitalizing revenue expenditures or to structure certain transactions. In the above cases, managers' meticulous use of accruals can improve the quality of earnings while the reckless use of accruals by the managers can deteriorate the quality of earnings.

3.4.2.1 Accruals Improve Earnings Quality

Accruals play a pivotal role in the financial reporting process that generates accounting information conveyed to the investors for making investment, credit or other decisions. The primary output of financial reporting is the financial statements. The single most important item among all financial statements is net income or earnings. Earnings are the summary measure of firm performance produced under the accrual basis accounting. Managers can use accruals to make earnings report more informative for users. Management can convey its private signal about the firm's financial performance through its usage of accruals in the earnings generation

process or through the selection and application of certain accounting methods or choices deemed to provide credible signals of a firm's financial performance (Subramanyam, 1996; Demski 1998; Fields et al., 2001; Arya et al., 2003; Guay, 2006).

3.4.2.2 Accruals Impair Earnings Quality

However, the academic literature and the financial press have been skeptic on whether the accruals increase earnings quality and thus, make financial reports more informative, or managers use accruals to manipulate earnings number, leading to erosion in earnings quality. Managers use accruals as potential instruments for earnings management, which can be defined as a purposeful intrusion of management in the financial reporting process to extract personal gain for the management itself (Schipper, 1989).

Managers need to apply considerable judgment in estimating accruals. This raises a possibility that managers can deliberately misuse their power of judgment with malicious intent. They can intentionally misapply accounting methods or restructure business transactions to either misguide some investors about the true economic performance of the firm or to affect the contractual outcomes that depend on the reported earnings number (Schipper, 1989; Healy and Whalen, 1999; Dechow and Skinner, 2000; Nelson et al., 2002). However, the questions remain as to what extent managers will assist investors to form rational expectations about firm's operating performance through their choice of accruals or how far they will be involved in costly earnings management activities through accruals manipulation. Regardless of the intention of the management for the choice of accruals, the resulting accruals number will have a significant effect on the quality of accruals and earnings. Moreover, accruals can also introduce a transitory element in earnings that reduces the utility of earnings as a measure of firm's current or future performance, and affects the quality of earnings. Thus, given that Generally Accepted Accounting Principles (GAAP) confers management substantial flexibility to apply judgments in estimating accruals, it is imperative that the quality of accruals is an important factor in generating high-quality earnings.

3.4.3 Accruals and Other Attributes of Earnings

Accruals have important implications for different properties of earnings. Sloan (1996) examines the role of cash flows component and accruals component in the time-series behavior

of earnings and shows that accruals are less persistent than cash flows, suggesting that the persistence of earnings decreases when accruals constitute a large part of earnings relative to cash flows. Xie (2001) extends Sloan (1996) by suggesting that the lack of persistence in earnings is mainly driven by the reversal of abnormal accruals. Thomas and Zhang (2002) find that the high accruals firms earn negative future abnormal returns because of one specific accrual, namely inventory. Dechow and Dichev (2002) show that the lack of persistence can also be caused by estimation errors in the accruals. Barth et al. (2001) find that accruals improve the predictability of earnings for future cash flows. Dechow and Schrand (2004) note that accruals are used to smooth cash flow volatility that does not reflect variation in the underlying firm performance. Ball and Shivakumar (2006) argue that accruals are used to reflect timely recognition of economic losses. These findings suggest that accruals have a significant impact on other attributes of earnings.

3.5 Components of Earnings Quality

The accruals-based earnings quality metrics represent total earnings quality that are jointly determined by intrinsic (innate) factors, such as firms' business models and economic environments, and by management's (discretionary) reporting and implementation decisions. In addition, any earnings quality proxy measures quality with an error. Therefore, any measure of earnings quality contains, at least, three subcomponents: innate earnings quality, discretionary earnings quality, and noise. The portion of earnings quality associated with firms' innate characteristics stemming from business model and operating environmental uncertainty is designated as innate earnings quality, the portion of earnings quality determined by management's discretionary choices and judgments due to managerial incentives or opportunism is designated as discretionary earnings quality, and finally, the portion associated neither with business fundamentals nor with managerial discretion represent measurement error or noise.

Dechow and Schrand (2004) suggest that some firms will have lower quality earnings even in the absence of earnings management due to the nature of their business. For example, firms with higher growth potential and firms doing business in turbulent environment have low-quality earnings in general. Thus, both managerial opportunism and the economic environment of the firm can influence the quality of accounting earnings. Similarly, Dechow et al. (2010) contend that earnings quality is determined by both the firm's fundamental performance and the

accounting measurement system. They note that accounting literature often fails to distinguish properly the effect of fundamental performance on earnings quality from the effect of the accounting measurement rules. In a recent paper, Francis et al. (2005) empirically distinguish innate and discretionary component of earnings quality. While the innate component stems from the business model and operating environment of the firms, the discretionary component arises from the factors associated with the financial reporting process, such as management implementation decisions, the financial reporting standards, auditing and corporate governance structures, and regulatory scrutiny.

Dichev et al. (2013) investigate CFOs' perceptions about the underlying drivers of earnings quality. Especially they tend to focus on comparing the role of two categories of determinants: innate determinants, e.g., the firm's industry and business model vs. discretionary determinants, e.g., corporate governance and managerial discretion. The result suggests that CFOs ranked firm's business model as the most important driver of earnings quality (74% CFOs rate it as highly influential) followed by accounting standards (60.4%), the company's industry (56.8%), macro-economic conditions (55%) and the firm's internal controls (50%). The other three determinants that exert less influence on earnings quality are the board of directors (48%), reporting choices (43.2%) and the operating cycle (40.2%).[5] The evidence implies that most of the dominant determinants of earnings quality are beyond the control of the firm or, at least, external to its accounting function. As a result, recent research has distinguished between innate and discretionary factors and investigated the differential effect of each factor on market outcomes (Francis et al., 2005). The survey result also finds that CFOs attach moderate to less importance on some highly discussed factors such as the role of the auditors, the SEC enforcement process, and the prospect of litigation.

Discretionary factors have received much attention in the literature while innate factors have recently been recognized by the researchers and practitioners as significant drivers of earnings quality. The distinction of innate vs. discretionary factors is important because innate factors like macro-economic forces are exogenous to the firms, and thus, management and stakeholders cannot influence them much except understand and acknowledge them. In contrast,

[5] The percentage in the parentheses represents the percentage of total number of CFOs who respond to this question and select a choice of 4 or 5 on a scale from 1 to 5 for the respective factor implying that earnings quality is highly influenced by that factor.

most of the discretionary factors like internal controls and various voluntary control mechanisms at the firm and industry level are within the control of management. In response to a more specific question on to what extent earnings quality is driven by the innate factors, CFOs estimate that innate factors (beyond managerial control) account for roughly 50% of earnings quality, where business models, industry, and macro-economic conditions play a prominent role. That means about 50% of earnings quality is driven by non-discretionary factors such as industry and macro-economic conditions (Dichev et al., 2013).

3.6 Conclusion

This chapter summarizes different perspectives of earnings quality. Despite several attempts by the researchers to define earnings quality, the concept remains elusive and till now there is no agreed upon definition of earnings quality. The definition of earnings quality is largely decision specific and differs from situation to situation depending on the purpose for which earnings will be used. The chapter then identifies different proxies of earnings quality used in the extant literature followed by the reasons for selecting accruals-based earnings quality for this research. Finally, the chapter recognizes that earnings quality is affected not only by management's discretionary reporting choices but also by firm's business model and operating environments, which allow the researchers to separate earnings quality into innate and discretionary components. Moreover, a survey result indicates that at least 50% of earnings quality is determined by innate factors (Dichev et al., 2013).

Chapter Four
Earnings Quality and Cost of Equity Capital

4.1 Introduction

The issue of whether poor earnings quality affects firms' access to capital through influencing the cost of obtaining fund from the public has drawn considerable attention of the academic researchers, practitioners and regulators in the last two decades. The role of accounting information in determining the cost of equity capital has confronted all the constituencies of the financial reporting process after Levitt (1998) claims that one important benefit of high-quality accounting standards is improved liquidity and reduced cost of capital in the financial markets. On a similar note, Neel Foster (2003), a former member of the Financial Accounting Standards Board (FASB) asserts that more information reduces uncertainty, and investors are willing to pay more for enhanced certainty. From the perspective of financial reporting, the upshot of these arguments is that more and better disclosures translate into a lower cost of capital for the providers of high-quality information. Recognizing the significance of high-quality disclosures in the capital market, Dechow et al. (20010) appeal to academic researchers to undertake more research on the determinants and consequences of poor quality earnings. However, despite such growing interest, the theoretical and empirical evidence concerning the adverse cost of capital consequence of poor earnings quality fail to reach a consensus that leaves the issue still open for further empirical investigation.

The extent to which earnings quality is related to the cost of capital is one of the most interesting issues in accounting and finance research. Despite a large body of research proposing that earnings quality, measured using various attributes, affects the cost of debt and equity capital, there is no agreement on whether earnings quality is priced in the cost of capital, or the underlying mechanism that connects earnings quality to the cost of capital (Kim and Qi, 2010). Theories have identified multiple linkages through which earnings quality can affect the cost of equity capital. One such link is the direct link where poor information quality affects the cost of capital by increasing investors' uncertainty about the precise assessment of future cash flows. Another is the indirect link where information quality is likely to affect the cost of capital via information asymmetry (Easley and O'Hara, 2004) or via market beta (Lambert et al., 2007). Implicit in the indirect link is the assumption that poor information quality results in information

asymmetry which in turn creates non-diversifiable liquidity risk or information risk that are manifested in the cost of capital measures. Developing a rational expectations asset pricing model, Easely and O'Hara (2004) contend that more private information increases the risk of uninformed investors to trade with privately informed investors since better-informed investors can adjust their portfolio weights to reflect private information. The model implies that a firm can affect its cost of capital by increasing the quality and quantity of information it provides to the investors. Taking a different approach, Hughes et al. (2007) conclude that while information asymmetry affects factor risk premium, it does not lead to cross-sectional differences in expected returns in their model. However, Hughes et al. (2007) note that while an asymmetric information factor does not arise endogenously in their model, their model is silent on whether a systematic information factor exists. Bhattacharya et al. (2013) provide empirical support in favor of an indirect link mediated by information asymmetry. They document that poor earnings quality is associated with increased information asymmetry as manifested in higher adverse selection component of bid-ask spread suggesting that poor quality earnings result in higher trading costs and lower liquidity in the financial market. The rationale behind poor quality earnings leading to higher information asymmetry is rooted in accrual-basis accounting in which accruals are used to estimate future cash flows and to allocate past cash flows. Therefore, any estimation errors in the accruals can increase the uncertainty of the investors about the distribution of the firm's future cash flows. To remove this uncertainty, some investors will acquire costly private information inducing information asymmetry between those privately informed investors and less informed investors. Armstrong et al. (2011) examine when information asymmetry among investors affects the cost of capital in excess of standard risk factors. They find that information asymmetry is positively related to the firms' cost of capital when markets are not perfectly competitive, and there is no relation between information asymmetry and the cost of capital when markets approximate perfect competition. The combined findings of these two papers imply that poor earnings quality can result in information asymmetry, and information asymmetry can affect the cost of capital in a market that is less than perfect. Lambert et al. (2007) also suggest an alternative indirect link where earnings quality can affect the cost of capital via its effect on systematic risk, often specified as unobservable forward-looking beta. Irrespective of the link, these theoretical studies generally posit an association between earnings quality and the cost of capital. While the existence of a relation between earnings quality and the

cost of capital is predicted by analytical models, those models are silent as to the magnitude of associations or to the likelihood that both direct and indirect links can exist. Bhattacharya et al. (2012) find statistically reliable evidence of both a direct link between earnings quality and the implied cost of equity and an indirect link mediated by information asymmetry or beta. Using path analysis, they show that the direct path is empirically more dominant than the indirect path(s). However, the relative importance of the direct versus the indirect paths depends on the level of competition in the market.[6] Their finding is thus consistent with the arguments in Lambert et al. (2011) that when market friction is high, information asymmetry serves as a mediating variable.

A handful of studies has examined empirically the impact of earnings quality on the cost of capital. Francis et al. (2004, 2005) create an accruals quality factor based on Dechow and Dichev (2002) accruals quality model and show that the accruals factor is incrementally informative in firm-specific time-series regressions of stock returns on the accruals quality factor and the Fama and French (1993) factors. On the basis of this finding, they propose accruals quality as a priced risk factor. However, some recent research has rejected this view. For example, Core et al. (2008) question the validity of the asset pricing tests using a "risk factor" formed on the basis of proxies for accruals quality to declare a candidate factor as priced risk factor. Cohen (2008) argues that controlling for endogeneity is important because firms consider both the benefits of improved reporting quality and the costs associated with the disclosure of propriety information. After controlling for firm-specific attributes that are likely to affect both the costs and benefits of providing high-quality information, Cohen (2008) reports no significant association between earnings quality and the cost of equity capital. In a related study, Nichols (2006) argues that the accruals quality "risk factor" is not similar to a traditional risk factor and captures information already impounded in cash flows variability. Mashruwala and Mashruwala (2011) raise concern about the validity of accruals quality as a proxy for information risk based on their findings that the effect of accruals quality on expected return is restricted to the month of January only. These studies indicate that the accruals quality "risk factor" can explain a trivial portion of the cross-sectional variation in stock returns once the market, size and distressed risk factors are controlled for. Kim and Qi (2010) reconcile the conflicting evidence reported by

[6] Bhattacharya et al. (2012) find that although the direct path always dominates, the importance of the indiect path increases when market is less than perfectly competitive.

Francis et al. (2005) and Core et al. (2008) by controlling low-priced stocks in the two-stage cross-sectional test. They also examine the underlying mechanism of the pricing effect of earnings quality and show that, consistent with the analytical model of Yee (2006), the effect of earnings quality on the cost of equity stems from fundamental risk.

In addition to showing that information risk as proxied by accruals quality affects the cost of capital, Francis et al. (2005) decompose earnings quality into innate and discretionary components and investigate whether the cost of capital effect is attributable to the innate portion of earnings quality or the discretionary portion of earnings quality, or both. Innate component of earnings quality is determined by firms' business model and operating environment whereas discretionary component of earnings quality is affected by managerial discretionary behavior. This distinction is important to shed light on whether the innate component that reflects economic fundamentals has different cost of capital effect than the discretionary component that reflects managerial choices. While there is no theory distinguishing the sources of information risk, previous research on the use of discretionary accruals (Guey et al., 1996) suggests that innate and discretionary earnings quality will have different cost of capital effects. Consistent with the predictions that follow from earnings management literature, Francis et al. (2005) find that the cost of capital effect of innate earnings quality is substantially larger than that of discretionary earnings quality.

Given the inconclusive evidence on whether earnings quality is priced or not, an empirical question remains as to whether earnings quality reflects systematic non-diversifiable risk that affects the cost of capital or idiosyncratic risk that can be eliminated by holding a well-diversified portfolio. To this tune, this chapter is primarily intended to provide empirical evidence on whether earnings quality affects the cost of equity capital in a large cross-section of Japanese manufacturing firms. The secondary purpose of this chapter is to identify the sources (intrinsic versus reporting) of earnings quality and examine the cost of capital effects of different sources to provide evidence on whether the components of earning quality (innate versus discretionary component) have different cost of equity capital effect.

4.2 Literature Review

The extent to which earnings quality affects a firm's cost of equity capital continues to be one of the most important but unresolved issues in the accounting and finance literature. In this

section, I review the related literature on the cost of equity capital effect of earnings quality. First, I outline the theory on the cost of equity consequence of improved earnings quality. Following that, I discuss the empirical findings on the cost of equity impact of earnings quality.

4.2.1 Theoretical Research on the Cost of Equity Effect of Earnings Quality

Theoretical research allows for the possibility of both direct and indirect links through which earnings quality can affect the cost of capital (Bhattacharya et al., 2012). The models developed by Lambert et al. (2007, 2011) predict a direct link between earnings quality and the cost of equity, an indirect link through information asymmetry in the imperfectly competitive market, and an indirect link via systematic risk, consistent with a Capital Asset Pricing Model (CAPM) setting. Several other studies (Diamond and Verrecchia, 1991; Easley and O'Hara, 2004) also suggest an indirect link where earnings quality affects the cost of equity through information asymmetry.

4.2.1.1 Direct Link between Earnings Quality and Cost of Equity

Lambert et al. (2011) specify a direct link between information risk as proxied by earnings quality and the cost of equity capital. They show that in a perfectly competitive market, high-quality earnings can affect the cost of equity capital directly by reducing the uncertainty and increasing the average precision of investors' assessments of firms' future cash flows. According to their model, if some investors acquire more precise information, this additional information is partially reflected in the price, thereby reducing the uncertainty of other uninformed investors. On the other way, disseminating more public information to more investors in a bid to reduce information uncertainty can also affect the cost of equity because more information improves the average level of information precision. Based on this model, Bhattacharya et al. (2012) identify a direct link between earnings quality and the cost of equity capital.

4.2.1.2 Indirect Link between Earnings Quality and Cost of Equity Mediated by Information Asymmetry

An indirect link suggests that earnings quality can be associated with the cost of equity capital through information asymmetry. This indirect link is based on the idea that earnings quality influences information asymmetry which, in turn, affects the cost of equity capital.

Therefore, the indirect link mediated by information asymmetry is derived from two streams of research. The first stream predicts that low-quality disclosures can exacerbate information asymmetry in equity markets by increasing incentives for private information collection and inducing more informed trading (Diamond and Verrecchia, 1991). The second stream predicts that information asymmetry among market participants increases the adverse selection risk for liquidity providers. In order to compensate for the risk of trading with informed investors, liquidity providers widen the spread between the ask and bid prices, thereby lowering liquidity and increasing the cost of capital (Glosten and Milgrom, 1985). Another line of research (Wang, 1993; Easley and O'Hara, 2004) under the second stream posits a link between information asymmetry and cost of equity and identifies information quality as a causal variable (Easley and O'Hara, 2004) affecting information asymmetry. The underlying assumption of this link is that information asymmetry creates non-diversifiable information risk which is priced in equilibrium, and poor information quality leads to an increase in information asymmetry. Wang (1993) showed that in a two-asset multi-period model, information asymmetry induces two opposing effects into asset prices. In one hand, uninformed investors demand a risk premium to cover the loss arising from the adverse selection risk. On the other hand, trading by informed investors helps stock prices to reveal more information that reduces the risk of the uninformed investors. As a result, the joint effect of these two opposing forces on the equilibrium rate of required return in this model is ambiguous. Easley and O'Hara (2004) take the issue further and investigate the role of the composition of information in determining a firm's cost of capital. They specifically focus on the exact roles played by public and private information. They argue that differences in the composition of information between public and private information (information asymmetry) influence the cost of capital because investors require a higher return to hold stocks with more private, and correspondingly less public, information. This higher return is a reflection of the fact that the existence of private information induces a risk for the uninformed investors who are not able to adjust their portfolios to incorporate new information. Hence, private information creates a new form of systematic risk for which investors require compensation in equilibrium.

Another body of literature (Hughes et al., 2007; Lambert et al., 2011) suggests that information asymmetry can affect the cost of equity capital in an imperfect market. Hughes et al. (2007) consider the effects of private signals in a competitive noisy rational expectations setting

and conclude that while greater information asymmetry leads to higher factor risk premiums and higher cost of capital, information asymmetry has no cross-sectional effect on the cost of capital. Using Diamond and Verrecchia's (1991) characterization of imperfectly competitive capital markets, Lambert et al. (2011) predict the possibility of an indirect link between earnings quality and the cost of equity mediated by information asymmetry. However, their main result is not based on information asymmetry; rather it is based on information imprecision. They dispute Easley and O'Hara's (2004) attribution of the expected returns effect of information quality to information uncertainty. They argue that the expected returns effect stems from the average level of information imprecision, regardless of how information is distributed across investors – that is, the expected returns effect is due to information uncertainty per se, not to the presence of differences in information uncertainty across investors. A change in information asymmetry can affect the cost of capital, but only because the average precision of information is also changing simultaneously. In other words, the dissemination of more information to more investors reduces the cost of capital, but only because it increases the average precision of investors, not because it reduces information asymmetry (Francis et al., 2006).

4.2.1.3 Indirect Link between Earnings Quality and Cost of Equity Mediated by Systematic Risk

Lambert et al. (2007) develop a CAPM-based model in which information quality impacts the cost of equity through its influence on systematic risk.[7] They show that earnings quality affects investors' assessment of the covariance of a firm's cash flows with those of the market, and this effect is non-diversifiable. Lambert et al. (2007) point out that there is no separate role for earnings quality as a risk factor in a CAPM consistent world. The effect of earnings quality on the cost of equity is found because earnings quality is one determinant of the unobservable forward-looking beta. It is important to recognize here that the earnings quality effect can be fully captured by an appropriately specified, forward-looking beta. Thus, their model does not provide support for an additional risk factor capturing "information risk." One justification for the inclusion of information variables in a cost of capital model would be to

[7] The framework in Lambert et al. (2007) is similar in spirit to the estimation risk literature, which posits that information environment affects a firm's beta to the extent the information uncertainty about the parameters of distribution is related to the market return. Thus, low information securities tend to have higher beta (Barry and Brown, 1985).

recognize that the empirical proxies for beta are measured using past data that may not capture full information effects (Lambert et al., 2007). The intuition of this model suggests that the most practical way to empirically explore the link between earnings quality and the cost of capital is via the beta factor.

Overall, extant research concludes that a firm's earnings quality is associated with the cost of capital either directly or indirectly via information asymmetry or systematic risk.

4.2.2 Empirical Findings on the Cost of Equity Effect of Earnings Quality

A growing number of empirical studies have tested the prediction of theoretical models regarding the cost of equity capital effects of earnings quality. However, empirical research on this issue produces mixed results and thus, is unable to provide unanimous support to the claim that the cost of equity capital is inversely related to the quality of earnings. In this section, I provide a summary of extant empirical findings on the relation between earnings quality and the cost of equity capital.

Botosan (1997) is the first empirical study that attempts to establish the association between the level of disclosure and the cost of equity for a sample of 122 manufacturing firms. Using a self-constructed disclosure index and implied cost of equity measure, Botosan (1997) documents that greater level of disclosure reduces the cost of equity capital for low analyst following firms but the relationship is not statistically significant for high analyst following firms. Botosan and Plumlee (2002) re-examined the association using three types of disclosures level and the expected cost of equity capital derived from inverting dividend discount model. They find inconsistent evidence that the cost of equity capital is decreasing in annual report disclosure level but is increasing in the level of more timely disclosures (quarterly disclosure). But, they do not find any association between the level of investor relations activities and the cost of equity capital. Bhattacharya et al. (2003) is a cross-country study showing an association between average cost of equity and earnings opacity. They combine three individual measures (earnings aggressiveness, loss avoidance and earning smoothing) to develop a composite measure of earnings opacity and show that countries with more opaque earnings have higher cost of equity. Francis et al. (2004) examine the expected returns effects of different accounting-based and market-based earnings attributes and find that firms with poor earnings quality (low values for each attribute) have higher cost of equity capital in general. They also find that accounting-based

earnings attributes such as accruals quality, persistence, and smoothness have higher effect on expected returns than market-based attributes. Francis et al. (2005) provide a detailed investigation of the expected returns effects of two proxies for earnings quality: the Dechow-Dichev (2002) measure of accruals quality and absolute abnormal accruals (estimated using various implementations of the modified Jones (1991) model). For both proxies, they confirm the expected return effect as well as a cost of debt effect of earnings quality. Francis et al. (2005) also form an accruals quality factor mimicking portfolio and show that this accruals quality factor loading is significantly positve in the asset pricing regressions. The inclusion of accruals quality factor both in the standard CAPM model and in the Fama-French three-factor model increases the explanatory power of asset pricing model and reduces the magnitude of the size and market loadings significantly. On the basis of this finding, they propose that this accruals quality risk factor represents undiversifiable information risk incremental to traditional risk factors. Following the same procedure, Ecker et al. (2006) construct an accruals quality mimicking factor and show that the coefficient of the factor (e-loadings) is positively correlated with most other proxies of earnings quality. These e-loadings are predictably lower for matured firms with good information environment and higher for firms with obvious evidence of poor quality earnings such as restatement firms and bankrupt firms. These studies establish that accruals quality represents a risk factor that is priced by the market.

In contrast to the interpretation that the accruals quality is a priced risk factor, Core et al. (2008) show that the expected return effect of earnings quality is not significant. Using two-stage cross-sectional tests of determining whether a candidate risk factor is priced or not, they fail to find evidence that the accruals quality factor constitutes a priced risk factor.[8] However, building on the same method that is used by Core et al. (2008), Kim and Qi (2010) find evidence of expected return effect of accruals quality after eliminating low priced stocks from the sample. Ogneva (2012) finds a significant negative relation between realized returns and accruals quality factor after controlling for cash flows shocks. These studies suggest that information risk interpretation of earnings quality depends on the research design that use realized returns as a proxy for expected return.

[8] While Core et al. (2008) fail to find evidence that the accruals quality factor is a priced risk factor, they find that the accruals quality factor loadings are related to implied cost of capital.

Francis et al. (2005) decompose accruals quality into innate and discretionary components and find that the innate component has a larger pricing effect. Several studies report effects similar to those in Francis et al. (2005) regarding a substantially larger cost of capital effect of the innate portion of earnings quality compared to the discretionary portion. For example, Grey et al. (2009) use realized cost of debt, industry-adjusted price-earnings ratios, and asset pricing regressions to test for the cost of capital effects of accruals quality in the Australian market. When they split accruals quality into an innate portion and a discretionary portion, they find strong evidence that innate accruals quality is priced, whereas the discretionary portion has small and insignificant pricing effects. Motivated by the theoretical studies that predict a direct link from earnings quality to cost of equity or an indirect link through information asymmetry, Bhattacharya et al. (2012) analyze the relative importance of the different paths that potentially link earnings quality and cost of equity. They find that the direct link between earnings quality and the cost of equity dominates the indirect link (through information asymmetry) in all settings they investigate: innate versus discretionary earnings quality, CAPM versus 3-factor model, different degrees of market competitiveness. They further show that the degree of dominance varies predictably when the setting varies.

Two empirical costs of capital studies explicitly link earnings quality and fundamental risk. First, Chen et al. (2007) test the empirical prediction from Yee's (2006) model and confirm that the expected returns effect of earnings quality as measured by accruals quality is an increasing function of underlying fundamental risk. Second, Nichols (2006) shows that the accruals quality factor mimicking portfolio has a substantial realized return effect and that the effect is associated with cash flow shocks, i.e., it is associated with fundamental risk.

Cohen (2008) and Liu and Wysocki (2007) provide evidence consistent with the prediction that information quality should not affect the cost of equity capital after controlling for firm-specific determinants of information quality. Cohen (2008) finds that earnings quality is significantly related to the cost of equity before taking into account the endogenous nature of disclosure quality that can be strategically chosen by management to reduce the cost of equity. When he uses an instrumental variable approach to account for the determinants of earnings quality, the pricing effect is found to be insignificant. Liu and Wysocki (2007) find that after controlling for the innate determinants of earnings quality, the remaining pricing effect is not significant.

In summary, using different proxies for the cost of equity and several measures of earnings quality, these studies find that there is a significant relation, both economically and statistically, between earnings quality and the cost of equity. However, there are few exceptions to this general finding suggesting that there is no relation between these two constructs. The weight of the existing empirical evidence also suggests that a non-trivial portion of the expected returns effect of earnings quality seems to be associated with the intrinsic determinants; the effects of discretionary determinants are less significant both statistically and economically.

4.3 Hypotheses Development

4.3.1. Cost of Equity Effect of Earnings Quality

The extent to which earnings quality is associated with the cost of equity capital is one of the most important issues in accounting. Despite a sizeable body of research suggesting that earnings quality, measured using various attributes, affects costs of equity capital, there is no consensus on whether earnings quality is priced in the cost of capital, or the underlying mechanism linking earnings quality to the cost of capital. The extant theoretical and analytical research (Easley and O'Hara, 2004; Leuz and Verrecchia, 2004; Hughes et al., 2007; Lambert et al., 2007, 2012) posits that a firm's earnings quality is associated with the cost of equity directly or indirectly via information asymmetry or via market risk. Francis et al. (2005) argue that accruals quality is a priced factor in the cost of equity capital while Core et al. (2008) counter this argument using two-stage cross-sectional tests. Kim and Qi (2010) reconcile the difference between Francis et al. (2005) and Core et al. (2008) by showing that accrual quality is a significant priced risk factor in the cross-sectional tests once low-priced returns, defined as returns with two adjacent prices less than $5 (sometimes referred to as "penny stocks"), are controlled in the cross-sectional regression. Cohen (2008) and Liu and Wysocki (2007) show that after controlling for firm-specific determinants of disclosure decisions, earnings quality is not significantly related to the cost of equity capital. Albeit disconcerting theoretical and empirical evidence, the weight of evidence drifts in favor of the pricing effect of earnings quality. Therefore, I formalize my first hypothesis, stated in alternative form:

H1: Earnings quality is negatively associated with the cost of equity capital

To test this hypothesis, I use the empirical measures of earnings quality outlined in section 4.4.1, and two proxies for the cost of equity; Industry-adjusted EP ratio and implied cost of equity capital estimated by reverse engineering the valuation models presented in Easton (2004).

4.3.2 Cost of Equity Effect of Innate versus Discretionary Component of Earnings Quality

The theoretical models suggest a pricing role for earnings quality but do not distinguish between possible components of earnings quality. That is, these models do not posit differences between the pricing effects of poor earnings quality that is driven by innate features of the firm's business model and operating environment, and poor earnings quality that is discretionary, i.e., due to accounting choices, implementation decisions, and managerial error. However, research on accounting choice and earnings management suggests a potential distinction between the pricing effects of the innate and discretionary components of earnings quality (Francis et al., 2005).

Three competing views exist in the accounting literature that explain and predict management's discretionary accounting choices (Holthausen, 1990; Badertscher et al., 2012). One view is that discretionary accounting choices are made to reveal managers' private information about the future prospects of a firm. This view is referred to as the ''informational perspective'' of discretionary accounting choices. Under this view, managers utilize the flexibility in GAAP to enhance the relevance and reliability of the reported accounting information to improve its predictive usefulness and representational faithfulness. A second view on managers' discretionary accounting choices holds that managers make discretionary accounting choices to disguise the true underlying economic performance of the firm and to enhance their personal welfare at the expense of the investors. This view is known as "opportunistic perspective." A third view in the accounting choice literature on managers' discretionary accounting choices is based on contracting perspective that can be divided into the *ex-post* opportunistic contracting hypothesis and ex-ante efficient contracting hypothesis. While the opportunistic contracting hypothesis includes the bonus plan hypothesis and the debt covenant hypothesis, the efficient contracting hypothesis implies that accounting choices are made to minimize contracting costs amongst the various contracting parties to the firm which, in turn, maximizes firm value (Badertscher et al., 2012). In a similar vein, Guay et al. (1996)

suggest that the discretionary component of earnings quality is a medley of three distinct subcomponents. While the performance subcomponent improves the quality of earnings by enhancing the ability of earnings to measure true economic performance in a reliable and timely way, managerial opportunism and pure noise, respectively, reduce the quality of earnings by distorting real economic performance. Francis et al. (2006) note that the magnitudes of the earnings quality effects of these subcomponents would be expected to differ, implying that the net earnings quality effect of management's implementation decisions could be positive, negative or neutral. Nonetheless, based on the results and discussion of Guey et al. (1996), Francis et al. (2005) infer that research findings on the use of discretionary accruals suggest a possible difference in the cost of capital effects of innate versus discretionary earnings quality because of the fact that in a large sample covering long time periods, there will be some observations where managerial discretion is used to signal credible information about future performance, and there will be some observations where managerial discretion is used to reap opportunistic gains. This reasoning implies that discretionary earnings quality is expected to have cost of capital effects that reflect some mixture of performance improvement and opportunism plus noise. To the extent that discretionary earnings quality reflects a mixture of counter-intuitive effects such as earning quality increasing and earnings quality decreasing effects, Francis et al. (2005) expect that overall cost of capital effect of discretionary component of earnings quality will be smaller than the effect for innate component of earnings quality.

Francis et al. (2005) investigate whether the expected returns effect is attributable to the innate portion of earnings quality, the discretionary portion, or both. Consistent with their predictions, they find that the expected returns effects of innate earnings quality are substantially larger than the effects of discretionary earnings quality. Several studies report effects similar to those in Francis et al. (2005) regarding a substantially larger cost of capital effect of the innate portion of earnings quality compared to the discretionary portion. For example, Grey et al. (2009) use realized cost of debt, industry-adjusted price-earnings ratios, and asset pricing regressions to test for cost of capital effects of accruals quality in the Australian market. When they split accruals quality into an innate portion and a discretionary portion, they find strong evidence that innate accruals quality is priced, whereas the discretionary portion has small and insignificant pricing effects. Grey et al. (2009) attribute the finding that discretionary earnings

quality has an insignificant cost of capital effect to Australian institutional and regulatory factors that limits discretionary discretion.

Following Francis et al. (2005), I formulate my second hypothesis on the basis of the differential cost of equity effects between innate and discretionary components of earnings quality. I state H2 in its alternative form which implies that investors put more emphasis on a unit of innate earnings quality than a unit of discretionary earnings quality:

H2: The innate component of earnings quality has larger impact on cost of equity capital than discretionary component of earnings quality

In order to test this hypothesis, I decompose earnings quality measure into innate and discretionary components following the approach applied by Francis et al. (2005) to be discussed in section 4.4.2.

4.4 Earnings Quality and Its Components

4.4.1 Measures of Earnings Quality

The objective of this chapter is to investigate the effect of total earnings quality and its components on firm's cost of equity capital. Since the theoretical models predicting an association between earnings quality and the cost of equity consider the precision of earnings as a desirable quality of earnings, I think that accruals-based earnings quality measures that capture the precision of earnings with regard to a valuation relevant construct are suitable for my research question. Prior research by Francis et al. (2004) finds that accounting-based earnings attributes have larger effect on the cost of equity than market-based attributes, and among all the accounting-based attributes, accruals quality has the strongest effect. Aboody et al. (2005) and Francis et al. (2005) find a significant cost of equity effect of absolute abnormal accruals calculated from different versions of Jones (1991) model. All these results suggest that the most pertinent measures of earnings quality for my purpose should focus on accounting fundamentals. Consequently, I find two accruals-based measures of earnings quality such as Dechow-Dichev (2002) accruals quality measure as extended by McNichols (2002) and Kasznik (1999) version of Jones (1991) absolute abnormal accruals measure as suitable and appropriate for this study.

4.4.1.1 Accrual Quality (DDSTD) Measure Based on Dechow and Dichev (2002) Model

The accruals quality measure is based on the Dechow and Dichev (2002) (hereafter DD) model. Intuitively, this measure views cash flows as fundamental to investors and focuses on the non-cash portion of accounting earnings known as accruals. This model is based on the fact that accruals adjust the recognition of cash flows over time to measure better firm performance. Since accruals are normally based on assumptions and estimates, the possibility of making wrong estimates is very likely and, if wrong, these erroneous estimates must be corrected in future accruals and earnings. DD argue that estimation errors and their subsequent corrections are noise that reduces the beneficial role of accruals. Therefore, the quality of accruals and earnings decreases when the magnitude of estimation errors increases. DD model measures accruals quality by the extent to which total current accruals map into operating cash flows. Under this approach, working capital accruals are regressed on cash flows from operations from the current period, last period and next period. The unexplained portion of the variation in working capital accruals is used as the basis for measuring the quality of earnings; that is, a greater unexplained portion implies lower quality. Specifically, the original version of DD model is as follows[9]:

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \upsilon_{i,t} \qquad \text{Eq. (4.1)}$$

where TCA is the total current accruals computed as $\Delta CA - \Delta CL - \Delta Cash + \Delta STDEBT$, ΔCA is the change in current assets, ΔCL is the change in current liabilities, $\Delta Cash$ is the change in cash, $\Delta STDEBT$ is the change in short-term debt included in current liabilities. CFO is the cash flows from operations calculated as NI-TCA+DEP, where NI is the net income, TCA is the total current accruals and DEP is the depreciation and amortization expense. Subscripts *i* and *t* are the firm and time subscripts, respectively.

In a discussion paper, McNichols (2002) suggests that adding changes in sales revenues and property, plant, and equipment (PPE) significantly increases the model's explanatory power and reduces measurement error. Using DD model augmented (as suggested by McNichols) with the fundamental variables from the Jones (1991) model, namely, property, plant, and equipment (PPE) and change in revenues leads to a better-specified model and sequence of residuals. Although McNichols (2002) advised to include fundamental variables from Jones model in DD model on the basis of incremental explanatory power of the independent variables, unlike Jones

[9] All the variables used in the estimation equation are scaled by average total assets. Appendix A presents detailed definition of all the variables.

model, she did not include depreciation in her measure of accruals to allow for consistency with DD model. Explicitly, I will estimate the following regression to examine whether cash flows have explanatory power for accruals after controlling for the change in current period sales and the level of property, plant, and equipment:

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \nu_{i,t} \qquad \text{Eq. (4.2)}$$

where ΔREV is the change in revenues and PPE is the gross value of property, plant, and equipment. Subscripts *i* and *t* are the firm and time subscripts, respectively.

4.4.1.2 Absolute Abnormal Accruals (KZABS) Based on Kasznik (1999) Version of Modified Jones (1991) Model

Abnormal accrual is another widely used measure of earnings quality on the basis of the view that accruals that are not determined by accounting fundamentals represent an inverse measure of earnings quality. The abnormal accruals measure is typically estimated using some variants of the Jones (1991) approach. I estimate following version of the abnormal accruals model used by Kasznik (1999) (hereafter KZ):

$$TA_{i,t} = \delta_0 + \delta_1(\Delta REV_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 \Delta CFO_{i,t} + \eta_{i,t} \qquad \text{Eq. (4.3)}$$

where TA is the firm *i*'s total accruals, computed as TCA-DEP, TCA is the total current accruals, DEP is the depreciation and amortization expense, ΔREV is the change in revenues, ΔAR is the change in accounts receivable, PPE is the gross value of property, plant and equipment, and ΔCFO is the change in cash flows from operation. Subscripts *i* and *t* are the firm and time subscripts, respectively. Equation (4.3) is a modified and extended version of Jones (1991) model, which describes total accruals as a function of the changes in revenue and the level of property, plant, and equipment. Following the suggestion of Dechow et al. (1995), Kasznik adjusts the sales revenue variable for the change in accounts receivable. Kasznik also includes the change in operating cash flows as an explanatory variable based on Dechow's (1994) finding that cash flow from operation is significantly negatively correlated with total accruals. I prefer Kasznik version over modified Jones version because the former version considers significant correlation between cash flows from operation and total accruals in addition to two fundamental accounting variables used by the latter version and results in higher adjusted R^2.

I estimate the parameters of the models in cross-section for each industry in year t to control for the effects of changing industry-wide economic conditions on total accruals and to

allow the coefficients to vary across years and industry (DeFond and Jiambalvo, 1994). Thus, the parameter estimates are industry and year specific rather than firm specific. The industry-year cross-sectional estimations yield firm- and year-specific residuals, which form the basis of earnings quality metric.

The first earnings quality measure, EQ1 (DDSTD) = $\sigma(\upsilon_{i,t})$, is the standard deviation of the residuals obtained from estimating equation 4.2, calculated over years t-4 through t and the second measure, EQ2 (KZABS) = $|\ \eta_{i,t}\ |$, is the absolute value of the residuals obtained from estimating equation 4.3. I will interpret larger standard deviation of residuals indicating poorer earnings quality while lower absolute value represents a higher quality of earnings. The two types (standard deviation of residuals and absolute value of residuals) of earnings quality measures are conceptually different in one aspect that, if a firm has consistently large residuals resulting into small standard deviation, that firm is said to have relatively good earnings quality because there is little uncertainty about its accruals and the quality of earnings.

4.4.2 Separating Earnings Quality into Innate and Discretionary Components

The underlying assumption of accruals-based earnings quality measure is that earnings quality is a function of managerial discretion. However, a major difficulty in understanding managerial discretion is the unobservability of managerial intent. Prior research has attempted to overcome this unobservability issue by examining the net effect of managers' reporting decisions on the level and properties of earnings or accruals. In doing so, researchers have applied various research design that partition accruals into normal component representing business fundamentals and a discretionary component reflecting managerial discretion. To isolate discretionary accruals from total accruals researchers have estimated the statistical association between accruals and firm fundamentals by regressing accruals on a set of variables capturing firm fundamentals. The portion of accruals that cannot be explained by firm fundamentals is designated as discretionary accruals and this unexplained portion is used as a measure of the management reporting discretion or as a measure of earnings quality. But a potential problem with this type of research design is the incompleteness of variables meant to capture firm fundamentals implying that variation in accruals associated with the firms' fundamentals is ascribed to managerial discretion (Dechow et al., 2010). These models assume that managerial intent is unrelated to firm fundamentals. Then, any correlation between the residual of the model

(a measure of managerial intent) and firm characteristics is taken as a model misspecification. As a result, recently researchers have placed emphasis to parse out factors related to firm's operating performance or firm's innate characteristics from the accrual model residuals. Francis et al. (2005) showed that the DD measure of accruals quality can be separated into its innate and discretionary components. They employ regression analysis where a measure of earnings quality is regressed on a set of innate factors and empirically define innate earnings quality as the fitted value and discretionary earnings quality as the residual.

Following Francis et al. (2004, 2005), I use two approaches to distinguish between innate and discretionary components of earnings quality. Both methods use summary indicators to capture the influence of operating environment and business model on earnings quality. These effects are referred to as innate factors, recognizing that the description is not exact because management can change the business model or the operating environment of a firm as part of strategic decisions. Innate factors are viewed as being slow to change relative to factors that influence discretionary earnings quality; that is, innate factors are predetermined at any given reporting date, but susceptible to modification over time. Innate factors are also not within the control of managerial leeway.

Under the first approach, I regress a measure of earnings quality on innate factors that prior researchers believe describe the firm's business model and its operating environment. For example, Francis et al. (2005) implement this approach using DD model of earnings quality and innate factors. For this purpose, I use the five innate factors considered by Dechow and Dichev (2002) as explaining accrual quality such as firm size, cash flow variability, sales variability, the length of operating cycle, and incidence of negative earnings realizations. Dechow and Dichev (2002) posit and find that accrual quality is inversely associated with firm size, and positively associated with cash flow variability, sales variability, operating cycle and incidence of losses. Building on DD, Francis et al. (2004) add measures of intangible intensity, intangible dummy and capital intensity as additional factors capturing business model. I also include these three factors. My first approach to identifying the components of earnings quality relies on annual estimations of the following equation:

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \quad \text{Eq. (4.4)}$$

where, EQ is a measure of earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of Jones (1991) model. The predicted values from equation (4.4) yield an estimate of the innate portion of firm i's earnings quality in year t,

$$\text{InnateEQ}_{i,t} = \hat{\gamma}_0 + \hat{\gamma}_1 \text{ASSET}_{i,t} + \hat{\gamma}_2 \text{VCFO}_{i,t} + \hat{\gamma}_3 \text{VSALES}_{i,t} + \hat{\gamma}_4 \text{OPCYCLE}_{i,t} + \hat{\gamma}_5 \text{NEG}_{i,t} + \hat{\gamma}_6 \text{INTAN}_{i,t} + \hat{\gamma}_7 \text{INTANDUM}_{i,t} + \hat{\gamma}_8 \text{CAPITAL}_{i,t} \qquad \text{Eq. (4.4a)}$$

The residual[10] from equation (4.4) is the estimate of the discretionary component of firm i's earnings quality, $\text{DiscEQ}_{i,t} = \hat{\mu}_{i,t}$. This approach yields distinct estimates for each of the two components of earnings quality.

The second approach includes total earnings quality as the variable of interest and all the innate factors affecting earnings quality as control variables in the cost of equity tests. In these augmented regressions, the coefficient on total earnings quality captures the cost of equity effect that remains after taking into account the effect of innate factors. Following Francis et al. (2005), I will interpret this coefficient as a measure of the cost of equity effect of discretionary earnings quality. Francis et al. (2005) note that the precision of the estimates of these two components depends on the researcher's ability to identify and measure the factors that describe the firm's business models and its operating environment using accounting variables and other factors.

The first and second approaches to separating total earnings quality into innate and discretionary components are not substitutes. Only the first approach provides a distinct estimate of innate and discretionary earnings quality allowing direct comparisons of the effects of innate versus discretionary earnings quality. On the other hand, the second approach implies the effect of discretionary earnings quality after controlling for the effect of innate factors. The two approaches are also different in their sensitivity to omitted innate factors. Under the first approach, omitted innate factors lead to model misspecification in the regression of total earnings quality on innate factors, and more noise in the error term. Other things being equal, this noise would bias the coefficient estimate on DiscEQ toward zero. Under the second approach, an incomplete set of innate factors would result in an upwardly biased coefficient estimate on TotalEQ, which essentially reflects the effect of discretionary earnings quality (Francis et al., 2006).

4.5 Model Specification

[10] Francis et al. (2005) recognize that the residual term reflects both discretionary earnings quality and noise. Similarly, measures of discretionary accruals derived from different versions of the Jones model will include the effects of management intent and noise in accruals.

4.5.1 Empirical Model to Examine First Hypothesis

My first hypothesis in alternative form predicts that firms with poor earnings quality experience higher cost of equity capital To test this hypothesis, I use the empirical measures of earnings quality outlined in section 4.4.1, and two proxies for implied cost of equity; industry-adjusted EP ratio and implied equity cost of capital estimated by reverse engineering the valuation models presented in Easton (2004). Previous studies have utilized different proxies for the equity cost of capital which is not directly observable. There are different methods available in the literature for estimating the cost of equity capital. One popular and commonly used method is Fama-French three-factor model (Fama and French, 1993) although Fama and French (1997) recognize that three-factor model does not provide a reliable estimate of the equity cost of capital both at the firm level and at the industry level. Another alternative is to use realized stock returns to proxy for the equity cost of capital. Realized returns are a function of two things: expected returns or discount rates and information surprises (Campbell, 1991). Assuming that information surprises are zero in expectation, average realized returns are used as a proxy for expected returns. This approach has limitation too, given that the correlation between expected returns and ex-post realized returns is weak, and information surprises may not have zero mean yielding a biased proxy for expected returns (Elton, 1999). Due to the limitations of these approaches, researchers attempt to infer ex-ante equity cost of capital rates using an implied approach. Under this approach, one needs to assume an equity valuation model in order to estimate the implied cost of equity using the current stock price and market expectations of future cash flows or earnings. The valuation models differ in terms of the assumptions made regarding growth rates, terminal values, and forecast horizons. There is a debate in the literature about the advantages of various ex-ante measures (e.g., Botosan and Plumlee, 2005; Guay et al., 2005; Easton and Monahon, 2005). Botosan and Plumlee (2005) rank five proxies of the expected rate of return by comparing the cross-sectional variation in the proxies that is explained by various risk measures. Based on their result, they conclude that target price method used by Botosan and Plumlee (2002) and PEG ratio based method suggested by Easton (2004) are consistently and predictably related to risk factors and dominate the alternatives they examine. The focus of the analysis in Guey et al. (2005) is on the correlation between realized return and various expected return proxies. They show, for all of the estimates that they evaluate, this correlation is not significantly different from zero, and it is often negative. The results in Easton

and Monahan (2005) suggest that the seven accounting-based proxies that they consider are not reliable measures of expected returns. None of the proxies have a significant positive association with realized returns even after controlling for the bias and noise in realized returns attributable to contemporaneous information surprises. Since there is no consensus on the supremacy of any single measure over others, I use two commonly accepted methods of calculating implied equity cost of capital to ensure that the results are robust and compelling.

While the study mainly focuses on the association between earnings quality and the cost of equity capital, the extant literature on the detrminants of the cost of capital suggests that some firm-specific factors are associated with the cost of equity capital. These factors are discussed below:

(i) The CAPM model suggests that the firm's expected returns are positively associated with its market beta. I include BETA in equation (4.5) to control for this risk factor. I expect a positive relation between BETA and the equity cost of capital. Beta is the slope coefficient from the regression of monthly raw returns on the monthly market returns over a rolling five-year windows. I use TOPIX return as the market return.

(ii) Finance literature documents that firm size is negatively associated with the cost of equity. Therefore, I include a firm size in equation (4.5) as a control variable and hypothesize that the risk of investing in a firm increases when information about the firm is not readily available. Since information is easily available for larger firms than for smaller firms, firm size is used as one proxy for the availability of information.[11] I use the firm's market capitalization and expect a negative association between SIZE and the equity cost of capital since previous research suggests that smaller firms are riskier than large firms.

(iii) Fama and French (1992) find that firms with higher book-to-market ratio earn higher realized returns. Chan et al. (1991) find that book-to-market ratio has the most significant positive impact on expected returns in the Japanese market. To control for risk associated with this measure, I include in equation (4.5) BM, the firm's book-to-market ratio, and expect a positive association between this variable and the equity cost of capital.

(iv) Modigliani and Miller (1958) suggest that as the amount of debt in the firm's capital structure increases, the risk of default increases. Therefore, I include leverage as an additional

[11] Another motivation for using firm size is presented by Berk (1995), who suggests that firm size is likely to be a catchall risk proxy.

explanatory variable. Leverage (LEV) is the ratio of interest-bearing debt to the market value of equity. I expect a positive relation between leverage and the equity cost of capital.

I estimate the following regression that relates cost of equity measures with two proxies of earnings quality after incorporating the control variables identified above to test my first hypothesis:

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t} + \alpha_2 BETA_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 LEV_{i,t} + \zeta_{i,t} \quad \text{Eq. (4.5)}$$

where, ImpCoE represents any of the two proxies of implied cost of equity, EQ represents either DDSTD or KZABS and BETA, SIZE, BM and LEV are control variables for common risk proxies. The hypothesized negative relation between cost of equity and earnings quality will be reflected in a positive and significant coefficient of EQ because DDSTD and KZABS are inverse measures of earnings quality in that higher values of EQ represent lower quality of earnings and vice versa. Thus, a positive and significant α_1 will support my first hypothesis.

4.5.2 Empirical Model to Examine Second Hypothesis

The first approach (Method 1) of distinguishing the cost of equity effects of innate and discretionary earnings quality substitutes InnateEQ and DiscEQ for EQ in the original cost of equity regression in equation (4.5). Specifically I estimate following regression:

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 InnateEQ_{i,t} + \alpha_2 DiscEQ_{i,t} + \alpha_3 BETA_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 BM_{i,t} + \alpha_6 LEV_{i,t} + \zeta_{i,t} \quad \text{Eq. (4.6)}$$

I conjecture that InnateEQ will have significantly larger effect on cost of equity than DiscEQ. An evidence that α_1 is significantly larger than α_2 from equation (4.6) will support my second hypothesis.

The second approach (Method 2) adds the summary indicators of innate factors as right-hand side variables to the original cost of equity capital regressions. The model appears like the following[12]:

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t} + \alpha_2 BETA_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 VCFO_{i,t}$$

[12] I exclude ASSET, one of the innate factors, from equation (4.6a) to avoid duplication of the same construct since firm size as measured by the log transformation of market value of equity is already included in the equation as a proxy for size.

$$+ \alpha_7 VSALES_{i,t} + \alpha_8 OPCYCLE_{i,t} + \alpha_9 NEG_{i,t} + \alpha_{10} INTAN_{i,t} + \alpha_{11} INTANDUM_{i,t}$$
$$+ \alpha_{12} CAPITAL_{i,t} + \zeta_{i,t} \qquad \text{Eq. (4.6a)}$$

The second approach does not provide a distinct estimate of the innate and discretionary components of earnings quality; rather, it implies the discretionary effect after controlling for the effect of innate factors. In this regression, the coefficient on EQ captures the cost of equity effect of the portion of earnings quality that is incremental to the effect captured by the innate factors.

4.6 Sample and Descriptive Statistics

4.6.1 Description of the Sample

Initially, 26,874 firm-year observations for the 18-year period (1996-2013) are retrieved from Nikkei NEEDS Financial Quest Database. The sample consists of only manufacturing companies listed in any one of the Japanese Stock Exchanges (Tokyo, Osaka, Nagoya, JASDAQ, etc.) and primarily covers all firms from 17 industries based on Nikkei two-digit industrial codes. I do not include financial institutions, insurance companies, and firms in service industries since earnings quality empirical models used in this study do not reflect their activities. The final sample period commences in 2002 and ends in 2012 because estimation of parameters for the DD Model requires lead and lag values of cash flows from operation and measures of earnings quality require five annual residuals. This means at least 7 years of data is required to calculate earnings quality of firm i in year t. I set another criterion to run an industry-year regression for all the earnings quality models that each industry should have at least 10 observations in a year. This criterion results in dropping all observations from shipbuilding and petroleum industry. After deleting firm-years due to missing information on any of the variables used to calculate earnings quality and its determinants, I end up with 15,640 firm-year observations representing 1492 firms having information on total, innate and discretionary earnings quality. For the cost of equity test, I calculate industry-adjusted EP ratios and PEG ratio based implied cost of equity. Since I use only positive earnings firm-year observations to estimate industry-adjusted EP ratio, the sample size reduces to 11,980 firm-year observations with positive earnings. For estimating implied cost of equity using Easton (2004) PEG ratio approach, I require assuming that $EPS_2 \geq EPS_1 \geq 0$. In total, these requirements produce a sample of 5,701 firm-year observations for the implied cost of equity test.

4.6.2 Descriptive Statistics

Panel B of Table 4.1 provides descriptive information on two earnings quality measures and their innate and discretionary components. The result indicates that the variability of earnings quality measure based on DD accrual quality model is less than that of earnings quality measure based on KZ absolute abnormal accrual model. Using the coefficient estimates derived from the annual regressions of Eq. (4.4), I calculate InnateEQ and DiscEQ using method 1. The mean (median) value of the innate component is 0.024 (0.022) for DDSTD and 0.028 (0.026) for KZABS, compared to a zero mean (-0.002 median) value of discretionary component for DDSTD and a zero mean (-0.006 median) value of discretionary component for KZABS. The zero mean value of DiscEQ is expected given that the discretionary component is defined as the prediction error from Eq. (4.4). The variability of innate portion of earnings quality is less than that of discretionary portion. This is consistent with the idea that innate factors are relatively stable, slow to change and are predetermined at any given reporting date than discretionary factors. Because EQ is linear in earnings quality (with larger values of EQ indicating poorer earnings quality), InnateEQ and DiscEQ are also linear in earnings quality. Therefore, the negative median value of DiscEQ implies that the discretionary component of earnings quality increases the quality of earnings. Unreported results show that 59% (61%) of the observations for DD (KZ) model have negative DiscEQ; this percentage is reliably different from chance (50%) at the 0.001 level. Following Francis et al.'s (2005) validity test of Method 1's decomposition of total earnings quality into InnateEQ and DiscEQ, I investigate overtime changes in each of these components. Francis et al. (2005) assume that firms with poor innate earnings quality would find it difficult to ameliorate their situation than would firms with poor discretionary earnings quality. I verify this proposition following Francis et al.'s (2005) method. Using a paired-sample test of the percentage year-to-year absolute change in InnateEQ and DiscEQ, I find that the average change in DiscEQ is significantly (at the 0.001 level) larger than the average change in InnateEQ for both measures. Specifically, the average change for DD (KZ) model is 217 (441) percentage points higher for discretionary component than for innate component (t-statistic = 15.72 and 11.99 respectively). These results do not change when I use raw values rather than percentage change values (t-statistic is 49.61 and 94.90 respectively for raw values). Overall, these results support Method 1's identification of the innate-discretionary partition (Francis et al., 2005).

Panel C of Table 4.1 presents summary statistics for the eight innate determinants of earnings quality. The sample mean values for the first five factors are 10.605 for ASSET (log of total assets), 0.057 for VCFO, 0.109 for VSALES, 5.054 for OPCYCLE (or 156 days) and 20 percent for negative earnings (NEG). Looking at the variables capturing intangibles intensity, the result shows that only 4 percent of the sample firm-years report zero expenditure on R&D and advertising. For all sample firm-years (including those with INTAN = 0), the mean value of intangible intensity (INTAN) is 4.4 percent. Finally, the mean value of capital intensity (CAPITAL) is 32 percent.

Table 4.1: Descriptive Statistics

This table reports the descriptive statistics of all the variables used for this study. All variables are winsorized at the bottom and top 1% levels. For the variables used in the regressions, the number of observations is mentioned next to the name of the variables. Descriptive statistics for earnings quality variables and earnings quality determinants variables are reported for the sample period 2002-2012 based on 15,640 observations. The sample period is 2002-2012 for earnings-price ratio based implied cost of equity measure and consists of 11,980 observations. The sample period is 2002-2011 for Easton PEG ratio based implied cost of equity measure and consists of 5,701 observations. Descriptive statistics for control variables are reported using the earnings-price ratio sample of 11,980 observations. All variables are defined in Appendix A.

Variable		Obs.	Mean	Std. Dev.	10%	Q1	Median	Q3	90%
Panel A: ***Implied cost of equity measures***									
Earnings-price ratio	EP	11,980	0.069	0.054	0.018	0.036	0.056	0.087	0.129
Industry-adjusted earnings-price ratio	IndEP	11,980	0.010	0.051	-0.038	-0.020	0.000	0.026	0.062
Easton's implied cost of equity	CoE	5,701	0.171	0.103	0.060	0.097	0.152	0.223	0.305
Panel B: ***Earnings Quality Variables***									
Dechow-Dichev accrual quality	DDSTD	15,640	0.024	0.019	0.008	0.013	0.019	0.030	0.045
Innate component	InnateEQ	15,640	0.024	0.011	0.014	0.018	0.022	0.028	0.035
Discretionary component	DiscEQ	15,640	-0.000	0.015	-0.013	-0.008	-0.002	0.005	0.016
Kasznik's absolute abnormal accrual	KZABS	15,640	0.029	0.029	0.004	0.009	0.020	0.038	0.062
Innate component	InnateEQ	15,640	0.028	0.012	0.018	0.022	0.026	0.032	0.039
Discretionary component	DiscEQ	15,640	-0.000	0.026	-0.023	-0.016	-0.006	0.010	0.031
Panel C: ***Earnings Quality Determinants Variables***									
Size (in log)	ASSET	15,640	10.605	1.580	8.786	9.516	10.409	11.521	12.742
Cash flows volatility	VCFO	15,640	0.057	0.068	0.019	0.027	0.041	0.063	0.102
Sales volatility	VSALES	15,640	0.109	0.180	0.027	0.042	0.070	0.119	0.203
Operating Cycle (in log)	OPCYCLE	15,640	5.054	0.442	4.490	4.813	5.087	5.333	5.551
Incidence of negative earnings	NEG	15,640	0.203	0.247	0.000	0.000	0.200	0.400	0.600
Intangible intensity	INTAN	15,640	0.044	0.241	0.003	0.009	0.023	0.405	0.081
Absence of reported intangible	INTANDUM	15,640	0.040	0.196					
Capital intensity	CAPITAL	15,640	0.316	0.137	0.149	0.220	0.309	0.405	0.495
Panel D: ***Control Variables***									
Systematic risk	BETA	11,980	0.907	0.508	0.289	0.547	0.864	1.225	1.573
Firm size (in log)	SIZE	11,980	9.802	1.802	7.679	8.472	9.573	10.897	12.311
Book-to-market ratio	BM	11,980	1.313	0.856	0.470	0.718	1.105	1.667	2.436
Leverage	LEV	11,980	0.806	1.171	0.001	0.081	0.381	1.004	2.114

4.7 Results and Analysis

4.7.1 Earnings Quality and Cost of Equity

In this section, I examine the association between earnings quality and proxies for costs of equity, as captured by industry-adjusted earnings–price ratios (Section 4.7.1.1) and Easton (2004) PEG ratio (Section 4.7.1.2). The sample used in the tests includes 11,980 firm-year observations for earnings–price ratios test (sample period 2002-2012) and 5,701 firm-year observations for Easton PEG ratios test (sample period 2002-2011). I base my analyses on pooled cross-sectional regression using the raw values of EQ, for the respective sample period. I calculate two-way clustered robust standard errors and t-statistics to assess the significance of the estimated coefficients. Table 4.1 provides descriptive statistics on cost of equity and common risk proxies known to influence the cost of capital. The result shows that mean (median) EP ratio is 6.9% (5.6%), with 80% of the sample having EP ratio between 1.8% and 12.9%. The mean (median) implied cost of equity based on PEG ratio approach is 17.1% (15.2%), with 80% of the sample having implied cost of equity between 6% and 30%.

Table 4.2: Mean Values of Market Beta (BETA), Earnings-Price Ratio (EP), Industry-adjusted EP Ratio (IndEP) and Easton's Implied Cost of Equity (CoE) Across Quintiles of Earnings Quality Measures

Panel A and Panel B report the averages of BETA, EP, IndEP and CoE variable in quintile portfolios formed on the basis of modified Dechow-Dichev (2002) accrual quality measure (DDSTD) and Kasznik version of Jones (1991) absolute abnormal accrual measure (KZABS) respectively. Quintile portfolios are formed each fiscal year separately for the measure of DDSTD and KZABS. *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Panel A: Mean of BETA, EP, IndEP and CoE across accrual quality measure (DDSTD)

Variable	Quintiles based on DDSTD EQ Quintile (1= High EQ Score; 5= Low EQ Score)					Mean diff. Q5 – Q1	(t-statistic)
	Q1	Q2	Q3	Q4	Q5		
BETA	0.792	0.828	0.861	0.927	1.05	0.258***	(15.449)
EP	0.062	0.065	0.066	0.070	0.081	0.019***	(11.234)
IndEP	0.003	0.006	0.008	0.010	0.022	0.019***	(11.432)
CoE	0.153	0.160	0.172	0.178	0.193	0.040***	(9.643)

Panel B: Mean of BETA, EP, IndEP and CoE across absolute abnormal accrual measure (KZABS)

Variable	Quintiles based on KZABS EQ Quintile (1= High EQ Score; 5= Low EQ Score)					Mean diff. Q5 – Q1	(t-statistic)
	Q1	Q2	Q3	Q4	Q5		
BETA	0.859	0.863	0.885	0.895	0.941	0.082***	(4.731)
EP	0.066	0.066	0.066	0.069	0.076	0.010***	(6.052)
IndEP	0.007	0.007	0.008	0.010	0.017	0.010***	(6.348)
CoE	0.169	0.160	0.169	0.176	0.182	0.013**	(2.761)

4.7.1.1 Industry-adjusted Earnings-price Ratios

The price-earnings ratio (P/E) gives an idea of what the market is willing to pay for the company's earnings. The higher the P/E, the more the market is willing to pay for the company's earnings. A high P/E indicates overpriced stock for which the market is assumed to have high hopes for the stock's future. Conversely, a low P/E may indicate a lack of confidence by the market participants or it can mean that this stock is a sleeper that the market has overlooked. Liu et al. (2002) suggest that the price multiple attached to earnings is often viewed as a short-hand valuation, and Francis et al. (2005) used the price-earnings ratio as an inverse indicator of the cost of equity. Following Francis et al. (2005), I examine whether higher earnings quality results in higher price-earnings ratios (lower cost of equity). Specifically, I examine the relation between earnings quality and industry-adjusted earnings-price ratios. I use earnings-price (EP) ratios to mitigate concerns about the effects of small values of earnings in the denominator, and I industry-adjust individual EP ratio because industry membership or a combination of risk and earnings growth works well for selecting comparable firms (Francis et al., 2005).

To calculate industry-adjusted EP ratios, I start with computing the median EP ratio for all positive earnings firms in year t in each of the 15 two-digit Nikkei industry groups. A minimum of five positive earnings firms is required in each industry in year t (excluding firm i). Firm i's industry-adjusted EP ratio (IndEP) is then calculated as the difference between its EP ratio and the median industry EP ratio in year t.[13] If investors decide to pay lower price for lower-quality earnings, such earnings are expected to have larger IndEP values. In Table 4.2, the mean values of EP and IndEP are presented for each quintile of the ranked EQ distribution for both earnings quality metrics. The result shows that both EP and IndEP are highest for the firms with the poorest earnings quality (firms in Q5) and that the differences in the mean EP and IndEP between the worst earnings quality quintile (Q5) and the best earnings quality quintile (Q1) are reliably differnet from zero suggesting that investors pay less for lower quality earnings. This result is consistent with the results in Francis et al. (2005). A regression analysis is conducted to provide a formal test of the association between earnings quality and industry-adjusted EP ratios. The results are presented in TotalEQ column of Table 4.3 for both earnings quality measures. The regression model controls for beta, firm size, book-to-market ratio, and leverage, which are deemed to be associated with the proxy for the cost of equity capital.

[13] Alternatively, using the ratio of firm i's EP to the median industry EP produces materially similar results.

Table 4.3: Regression of Industry-adjusted Earnings-Price Ratio on Earnings Quality and Other Control Variables

This table reports estimation of Eq. (4.5)

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t} + \alpha_2 BETA_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 LEV_{i,t} + \zeta_{i,t} \qquad \text{Eq. (4.5)}$$

where ImpCoE represents industry-adjusted EP ratio (IndEP), EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) accrual quality model and Kasznik version of Jones (1991) abnormal accrual model. All other variables are defined in Appendix A. The sample period is 2002-2012 and consists of 11,980 observations. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

			EQ = DDSTD measure	EQ = KZABS measure
Variable	Expected Sign	Base Model	TotalEQ Eq. (4.5)	TotalEQ Eq. (4.5)
Intercept		0.048*** (9.96)	0.035*** (7.44)	0.041*** (9.04)
$EQ_{i,t}$	(+)		0.322*** (6.49)	0.167*** (5.82)
$BETA_{i,t}$	(+)	0.006*** (3..95)	0.004*** (2.73)	0.005*** (3.61)
$SIZE_{i,t}$	(-)	-0.005*** (-12.07)	-0.004*** (-11.22)	-0.005*** (-11.99)
$BM_{i,t}$	(+)	0.003*** (3.34)	0.004*** (4.19)	0.004*** (3.60)
$LEV_{i,t}$	(+)	0.003*** (3.95)	0.003*** (4.03)	0.003*** (4.19)
N		11,980	11,980	11,980
Adjusted R^2		6.24%	7.28%	6.88%

Results (The Base Model column of Table 4.3) show that IndEP is positively related to market beta (Beta), book-to-market ratio (BM) and leverage (LEV) consistent with riskier and distressed firms have larger earnings-price ratios. The relationship between IndEP and SIZE is found to be negative, confirming the notion that smaller firms have higher cost of equity. The TotalEQ columns of Table 4.3 show that firms with poor earnings quality as denoted by higher EQ values have higher earnings-price ratios after controlling for the effects of other factors affecting earnings-price ratios. This result is consistent with the hypothesized association between earnings quality and the cost of equity, indicating that investors are willing to pay lower price for a yen of earnings when the quality of earnings deteriorates. In sum, the result implies that firms with lower quality earnings experience higher cost of equity capital.

4.7.1.2 Easton's Implied Cost of Equity

Recent literature has estimated the expected rate of return implied by market prices, accounting numbers and forecast of earnings and dividends. Estimates of the expected rate of return, which are often used as proxies for the cost of equity capital,[14] are obtained by inverting accounting-based valuation models. I use Easton (2004) PEG ratio-based implied cost of equity measures as a proxy for firm's cost of equity. Easton derived his valuation model from abnormal growth in earnings valuation model, which in turn is derived from the dividend capitalization model, by taking simplifying assumptions.[15] Valuations based on PEG ratio are special cases of the abnormal growth in earnings valuation model. The model assumes that abnormal earnings persist in perpetuity (growth in abnormal earnings = 0) and $DPS_1 = 0$. To estimate this model, one needs positive changes in forecasted future earnings. I estimate cost of equity by using the following simplified formula suggested by Easton (2004):

$$\mathrm{CoE} = \sqrt{(\mathrm{EPS}_2 - \mathrm{EPS}_1)/\mathrm{P}_0}$$

A large body of literature uses analysts' forecasts of earnings, which are known to be optimistic, to determine the expected rate of return implied by these forecasts, yielding upwardly biased estimates. Easton and Sommers (2007) estimate the bias, computed as the difference between the estimates of the implied expected rate of return based on analysts' earnings forecast and estimates based on current and future earnings realizations based on perfect foresight forecasts. They show that the bias is statistically and economically significant. The problem with both consensus analysts' forecast and "perfect foresight" assumption is that stock price reflects investors' expectation of future earnings, which may differ from analysts' forecast and actual earnings realization in the future. Following Easton and Sommers (2007), I use actual earnings per share information and stock price three months after fiscal year end to estimate implied cost of equity. I also assume that $EPS_2 \geq EPS_1 \geq 0$.

[14] Although the term cost of capital is commonly used to describe the implied expected rates of return, they are not the cost of capital unless the market prices are efficient and the earnings forecasts are the market's earnings expectations.

[15] Reverse engineering to obtain the implied expected rate of return depends critically on the maintained assumption about the growth rate beyond the period for which forecasts are available.

Table 4.4: Regression of Easton's Implied Cost of Equity on Earnings Quality and Other Control Variables

This table reports estimation of Eq. (4.5)

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t} + \alpha_2 BETA_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 LEV_{i,t} + \zeta_{i,t} \qquad \text{Eq. (4.5)}$$

where ImpCoE represents Easton's implied cost of equity (CoE), EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) accrual quality model and Kasznik version of Jones (1991) abnormal accrual model. All other variables are defined in Appendix A. The sample period is 2002-2011 and consists of 5,701 observations. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

			EQ = DDSTD measure	EQ = KZABS measure
Variable	Expected Sign	Base Model	TotalEQ Eq. (4.5)	TotalEQ Eq. (4.5)
Intercept		0.181*** (12.13)	0.160*** (10.93)	0.175*** (11.76)
$EQ_{i,t}$	(+)		0.575*** (4.90)	0.173*** (3.05)
$BETA_{i,t}$	(+)	0.022*** (7.06)	0.019*** (6.30)	0.022*** (7.02)
$SIZE_{i,t}$	(-)	-0.008*** (-7.07)	-0.007*** (-6.54)	-0.008*** (-6.97)
$BM_{i,t}$	(+)	0.025*** (7.70)	0.027*** (8.23)	0.025*** (7.77)
$LEV_{i,t}$	(+)	0.023*** (10.33)	0.023*** (10.38)	0.023*** (10.41)
N		5,701	5,701	5,701
Adjusted R^2		21.46%	22.21%	21.67%

Table 4.4 reports results of estimating a base version of Equation (4.5) that includes only the risk proxies. This regression provides a validation of PEG ratio based implied cost of equity estimates; I expect these estimates to be positively related to Beta (firms with higher betas have higher costs of equity), negatively related to SIZE (smaller firms have larger costs of equity), and positively related to BM (firms with larger book-to-market ratios have higher costs of equity) and LEV (firms with higher proportion of debt in the capital structure are riskier and have higher cost of equity). The mean coefficients on these variables are consistent with predicted relations.

Table 4.2 presents preliminary evidence on the relation between CoE and EQ. I report the mean CoE for each quintile of the ranked EQ distribution for both earnings quality metrics. The result shows that as I move from Q1 (the best earnings quality firms) to Q5 (the worst earnings quality firms) CoE increases monotonically for DDSTD measure (the increase is not monotonic for KZABS measure), meaning that the cost of equity increases as earnings quality declines. The

difference in mean values between extreme quintiles of earnings quality is significantly different from zero, suggesting that the cost of equity is higher for the worst earnings quality firms. The systematic risk as measured by market beta increases monotonically across earnings quality quintiles and the difference in mean values between the best and worst earnings quality quintile is reliably different from zero.

The result of examining whether earnings quality has the ability to explain the cross-sectional variation in firm-specific equity cost of capital estimates is presented in Table 4.4 in which TotalEQ column reports the result of estimating equation (4.5) using DDSTD and KZABS measures. The result shows that even after accounting for the effects of known determinants of the cost of equity, both measures of earnings quality exhibit significant association with the equity cost of capital. One implication of this result is that firms can enjoy a lower equity cost of capital by providing high-quality earnings information. These results lead to the conclusion that the quality of earnings affects the equity cost of capital beyond additional risk factors priced by the market, such as beta, size, book-to-market ratio, and leverage.

4.7.2 Determinants of Earnings Quality

To determine the importance of the innate determinants in explaining earnings quality, I estimate annual regressions of each earnings quality measure on the eight determinants. Table 4.5 reports the mean of the 11 coefficient estimates, where the t-statistics are based on the standard error of the 11 annual estimates. The result shows that the innate determinants explain moderate to low level of cross-sectional variation in accruals-based earnings quality measures (34 percent for DDSTD and 16 percent for KZABS). The explanatory power of the innate determinants is higher for standard deviation of residuals based earnings quality measure than absolute value of residuals based earnings quality measure. The five determinants (size, cash flow volatility, sales volatility, incidence of negative earnings and capital intensity) show consistent result (correct in predicted sign and significant) across both earnings quality measures. The length of operating cycle and the intangible intensity are positively related but not statistically significant in explaining the variation of any earnings quality measure. Intangible dummy shows consistent sign across earnings quality measures and is significantly related to DDSTD but insignificant for KZABS measures. To sum up, the eight innate determinants work moderately well in capturing firm's business model and operating environment.

Table 4.5: Regression of Earnings Quality on Innate Determinants

This table reports estimation of Eq. (4.4)

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \quad \text{Eq. (4.4)}$$

where EQ is a measure of earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of Jones (1991) model. The innate determinants are defined in Appendix A. The sample period is 2002-2012 and consists of 15,640 observations. All variables are winsorized at the bottom and top 1% levels. I estimate above equation separately for each year and reported coefficients are averages of 11 annual coefficients. t-statistics are calculated on the basis of the distribution of annual coefficients and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

		EQ = DDSTD measure	EQ = KZABS measure
Variable	Expected Sign	Eq. (4.4)	Eq. (4.4)
Intercept		0.03184*** (14.48)	0.02851*** (6.45)
$ASSET_{i,t}$	(-)	-0.00134*** (-15.65)	-0.00125*** (-8.68)
$VCFO_{i,t}$	(+)	0.08979*** (16.45)	0.10856*** (9.16)
$VSALES_{i,t}$	(+)	0.01450*** (8.32)	0.01308*** (4.57)
$OPCYCLE_{i,t}$	(+)	0.00014 (0.23)	0.00159 (1.93)
$NEG_{i,t}$	(+)	0.02017*** (19.16)	0.01442*** (8.87)
$INTAN_{i,t}$	(+)	0.00653 (1.17)	0.00079 (0.16)
$INTANDUM_{i,t}$	(-)	-0.00393*** (-5.09)	-0.00056 (-0.46)
$CAPITAL_{i,t}$	(-)	-0.01555*** (-24.48)	-0.01741*** (-7.81)
No. of Year		11	11
Adjusted R^2		34%	16%

4.7.3 The Pricing of Innate versus Discretionary Earnings Quality

The first approach to distinguishing between the cost of equity effects of innate and discretionary earnings quality substitutes InnateEQ and DiscEQ for EQ in the original cost of equity regression. The second approach adds the summary indicators of innate factors as right-hand side variables to the original cost of equity regression. In both approaches, and for each cost of equity test, I continue to control for variables found by prior research to be associated with the cost of equity.

Results of the tests based on industry-adjusted EP ratios as the measure of the cost of equity capital are reported in Table 4.6. For DD model based earnings quality measures, under Method 1, which explicitly separates the innate component of earnings quality, the result shows that both components have significant pricing effect but the difference between innate and discretionary pricing effect is not significant at conventional level (F-statistic = 0.21). Under Method 2, the discretionary component of earnings quality has a significant pricing effect. KZ model based earnings quality measure shows significant pricing effect of both components with the stronger effect of innate earnings quality than that of discretionary earnings quality under both methods. The difference between innate versus discretionary pricing effect is significant at the conventional level (F-statistic = 12.48). Table 4.7 documents results for implied cost of equity estimates. For DD model based earnings quality measures, under Method 2, discretionary earnings quality has a positive coefficient that is smaller and less significant than is the coefficient on total earnings quality. When both innate and discretionary components are included (Method 1), the coefficient on the innate component exceeds the coefficient on the discretionary component, with the difference being (F-statistic = 32.95) significant at the conventional level. For KZ absolute abnormal accrual based measures, Table 4.7 shows that innate component is significantly related to implied cost of equity (Method 1) but discretionary component is not significant. The difference between innate versus discretionary pricing effect is significant at the conventional level (F-statistic = 29.88). Method 2 also provides similar result since the earnings quality is not significant once the innate factors are controlled for, which means that discretionary component has no significant pricing effect.

4.7.4 Summary of Results

In summary, I can draw following inferences from the study:

First, overall results suggest that earnings quality is inversely related to the cost of equity capital, implying that investors consider earnings quality in pricing securities. Univariate analysis shows that systematic risk as measured by beta, industry-adjusted earnings-price ratios and Easton's implied cost of equity measures increase steadily as earnings quality becomes poor. Later, regression results confirm that firms with poor earnings quality experience higher cost for accessing to capital market.

Table 4.6: Regression of Industry-adjusted Earnings-Price Ratio on Components of Earnings Quality and Other Control Variables

This table reports estimation of Eq. (4.6) and (4.6a)

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 InnateEQ_{i,t} + \alpha_2 DiscEQ_{i,t} + \alpha_3 BETA_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 BM_{i,t} + \alpha_6 LEV_{i,t} + \zeta_{i,t} \quad \text{Eq. (4.6)}$$

$$ImpCoE_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t} + \alpha_2 BETA_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 VCFO_{i,t} + \alpha_7 VSALES_{i,t} + \alpha_8 OPCYCLE_{i,t} + \alpha_9 NEG_{i,t} + \alpha_{10} INTAN_{i,t} + \alpha_{11} INTANDUM_{i,t} + \alpha_{12} CAPITAL_{i,t} + \zeta_{i,t} \quad \text{Eq. (4.6a)}$$

where, ImpCoE represents industry-adjusted earnings-price ratio (IndEP), InnateEQ and DiscEQ are inverse measure of innate and discretionary earnings quality respectively. Specifically, InnateEQ is the fitted value from Eq. (4.4) and DiscEQ is the residual from Eq. (4.4). All other variables are defined in Appendix A. The sample period is 2002–2012 and consists of 11,980 observations. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

		EQ = DDSTD measure		EQ = KZABS measure	
Variable	Expected Sign	Method 1 Eq. (4.6)	Method 2 Eq. (4.6a)	Method 1 Eq. (4.6)	Method 2 Eq. (4.6a)
Intercept		0.033*** (5.72)	0.103*** (9.91)	0.030*** (5.14)	0.017*** (10.31)
$InnateEQ_{i,t}$	(+)	0.360*** (4.02)		0.430*** (5.01)	
$DiscEQ_{i,t}$	(+)	0.312*** (5.42)		0.137*** (4.92)	
$EQ_{i,t}$	(+)		0.267*** (4.76)		0.112*** (4.10)
$BETA_{i,t}$	(+)	0.004*** (2.70)	0.005*** (3.63)	0.005*** (3.21)	0.006*** (4.07)
$SIZE_{i,t}$	(-)	-0.004*** (-10.21)	-0.004*** (-11.03)	-0.004*** (-9.97)	-0.005*** (-11.47)
$BM_{i,t}$	(+)	0.004*** (4.20)	0.005*** (4.29)	0.004*** (3.73)	0.004*** (3.98)
$LEV_{i,t}$	(+)	0.003*** (4.02)	0.004*** (4.53)	0.003*** (4.46)	0.004*** (4.46)
$VCFO_{i,t}$	(+)		0.068*** (3.34)		0.091*** (4.37)
$VSALES_{i,t}$	(+)		0.008 (0.97)		0.012 (1.47)
$OPCYCLE_{i,t}$	(+)		-0.013*** (-8.97)		-0.013*** (-9.16)
$NEG_{i,t}$	(+)		-0.009*** (-2.81)		-0.005 (-1.46)
$INTAN_{i,t}$	(+)		-0.030* (-1.96)		-0.021 (-1.36)
$INTANDUM_{i,t}$	(-)		0.003 (0.86)		0.003 (0.75)
$CAPITAL_{i,t}$	(-)		-0.014*** (-3.09)		-0.016*** (-3.40)
N		11,980	11,980	11,980	11,980
Adjusted R^2		7.28%	8.91%	7.03%	8.67%
F-stat (p value) H_0: $\alpha_1 = \alpha_2$ H_1: $\alpha_1 > \alpha_2$		0.21 (0.648)		12.48*** (0.000)	

Table 4.7: Regression of Easton Implied Cost of Equity on Components of Earnings Quality and Other Control Variables

This table reports estimation of Eq. (4.6) and (4.6a).

$ImpCoE_{i,t} = \alpha_0 + \alpha_1 InnateEQ_{i,t} + \alpha_2 DiscEQ_{i,t} + \alpha_3 BETA_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 BM_{i,t} + \alpha_6 LEV_{i,t} + \zeta_{i,t}$ Eq. (4.6)

$ImpCoE_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t} + \alpha_2 BETA_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 VCFO_{i,t} + \alpha_7 VSALES_{i,t} + \alpha_8 OPCYCLE_{i,t} + \alpha_9 NEG_{i,t} + \alpha_{10} INTAN_{i,t} + \alpha_{11} INTANDUM_{i,t} + \alpha_{12} CAPITAL_{i,t} + \zeta_{i,t}$ Eq. (4.6a)

where ImpCoE represents Easton's implied cost of equity (CoE), InnateEQ and DiscEQ are inverse measure of innate and discretionary earnings quality respectively. Specifically, InnateEQ is the fitted value from Eq. (4) and DiscEQ is the residual from Eq. (4). All other variables are defined in Appendix A. The sample period is 2002–2011 and consists of 5,701 observations. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

		EQ = DDSTD measure		EQ = KZABS measure	
Variable	Expected Sign	Method 1 Eq. (4.6)	Method 2 Eq. (4.6a)	Method 1 Eq. (4.6)	Method 2 Eq. (4.6a)
Intercept		0.109*** (6.74)	0.182*** (5.80)	0.121*** (7.15)	0.187*** (6.07)
$InnateEQ_{i,t}$	(+)	1.800*** (6.59)		1.432*** (5.65)	
$DiscEQ_{i,t}$	(+)	0.224* (1.84)		0.022 (0.39)	
$EQ_{i,t}$	(+)		0.294** (2.33)		0.072 (1.28)
$BETA_{i,t}$	(+)	0.017*** (5.43)	0.014*** (4.57)	0.019*** (6.12)	0.164*** (4.73)
$SIZE_{i,t}$	(-)	-0.005*** (-4.27)	-0.006*** (-5.30)	-0.005*** (-4.95)	-0.006*** (-5.48)
$BM_{i,t}$	(+)	0.028*** (8.36)	0.027*** (8.15)	0.026*** (7.83)	0.026*** (8.01)
$LEV_{i,t}$	(+)	0.023*** (10.29)	0.020*** (8.92)	0.024*** (10.66)	0.020*** (8.87)
$VCFO_{i,t}$	(+)		0.048 (1.10)		0.087** (1.98)
$VSALES_{i,t}$	(+)		0.043 (1.63)		0.041* (1.86)
$OPCYCLE_{i,t}$	(+)		-0.006 (-1.23)		-0.007 (-1.28)
$NEG_{i,t}$	(+)		0.048*** (5.79)		0.052*** (6.29)
$INTAN_{i,t}$	(+)		-0.039 (-1.07)		-0.031 (-0.87)
$INTANDUM_{i,t}$	(-)		0.001 (0.09)		0.001 (0.09)
$CAPITAL_{i,t}$	(-)		-0.011 (-0.83)		-0.012 (-0.93)
N		5,701	5,701	5,701	5,701
Adjusted R^2		22.89%	23.24%	22.46%	23.14%
F-stat (p value) H_0: $\alpha_1 = \alpha_2$ H_1: $\alpha_1 > \alpha_2$		32.95*** (0.000)		29.88*** (0.000)	

Second, the summary indicators of innate operating and environmental factors explain a moderate portion of accrual quality and low portion of absolute abnormal accruals.

Third, I get fairly consistent evidence regarding differential pricing effect of innate versus discretionary earnings quality. Innate earnings quality has a larger pricing effect than discretionary earnings quality except for DDSTD's effect on industry-adjusted EP ratio. This result indicates that investors place greater emphasis on the innate component of earnings quality that reflects intrinsic features of a firm's business model, suggesting that investors are concerned with the source of information risk.

4.7.5 Sensitivity Tests

I conduct several sensitivity tests following the procedures of Francis et al. (2005) to ensure that my primary results hold when different estimation procedures, different specification for earnings quality variable, or alternative proxies for earnings quality are used. The summary results of various sensitivity tests are discussed in this section. First, I apply different estimation procedure. I re-run all the regression models using Fama-MacBeth (1973) annual regression approach and evaluate the significance of the results using the time-series standard errors of annual coefficient estimates. Unreported results show that annual regression approach produces qualitatively similar results as the pooled regression approach. Second, I repeat all the regressions using the quintile rank values of earnings quality measures in place of the raw values of earnings quality measures. The quintile ranks are useful for mitigating the effects of outliers and controlling for non-linearities. Unreported results suggest that the use of quintile rank values in the regression yields essentially the same results as those originally reported. Third, I examine the sensitivity of the results by excluding firms in the worst earnings quality quintile and find that all the results (not reported) are materially similar to those reported. However, the effect of earnings quality is attenuated as reflected in smaller magnitude of the coefficients after eliminating firm-year observations in Q5. Finally, with regard to alternative proxies, I repeat my tests using the standard deviation of residuals from the baseline Dechow-Dichev (2002) model and the absolute value of residuals from modified Jones (1991) model. The unreported result shows that the results for alternative proxies of earnings quality are statistically significant and qualitatively similar to those reported. Overall, the sensitivity tests confirm a significant negative association between earnings quality and the cost of equity capital.

4.8 Conclusion

Drawing on prior research, I investigate the relation between two accruals-based earnings quality measures and two proxies for implied cost of equity for a large sample of Japanese manufacturing firms over the period 2002-2012. I find that lower quality earnings are associated with smaller price multiples on earnings, higher cost of equity derived from inverting abnormal growth in earnings valuation model as implemented in Easton (2004) and larger equity betas. The results suggest that investors are aware of earnings quality while pricing securities. Moreover, these results persist after controlling for the known factors that can affect the cost of equity and are insensitive to different estimation procedures, variable specification, skewness and alternative proxies of earnings quality.

I also examine the costs of equity effects of two distinct components of earnings quality. I follow Francis et al. (2005) in order to decompose total earnings quality into innate and discretionary portion. Then, I test the pricing effect of innate versus discretionay component of earnings quality and find that innate and discretionary components of earnings quality have distinguishable costs of equity effects (except for DDSTD's effect on IndEP where I do not find significantly different impact of innate versus discretionary component) in that the innate component of earnings quality, on average, has a significantly stronger pricing effect than the discretionary component of earnings quality. This finding implies that investors are cognizant of the source of earnings quality in the determination of cost of equity. Consequently, they accord greater weight to earnings that reflect innate characteristics of the firm's operating environment, compared to earnings that reflect some mixture of management's attempt to provide informative signal, managerial opporutnism and pure noise. This result has important implications for capital allocation because rational investors who are aware of the innate and discretionary components of earnings quality will aptly place less emphasis to the latter in their determination of the cost of equity capital (Francis et al., 2005).

The results documented in this chapter have two implications for the assessment of financial reporting quality. First, the study indicates that earnings quality, which is used as a summary measure of overall financial reporting quality, is an important factor investors consider in pricing securities. Second, the result suggests that earnings quality is predominantly driven by management's long-term strategic decisions that affect innate factors rather than management's short-term reporting choices.

Chapter Five
Earnings Quality and Firm-specific Return Volatility

5.1 Introduction

The factors affecting firm-specific return volatility have stimulated considerable interest among financial economists and accountants in recent years since the publication of Campbell et al. (2001) paper exploring a surprising result that the firm-specific return volatility, commonly known as idiosyncratic volatility, has increased dramatically while the aggregate market volatility and industry volatilities remained basically unchanged through time. This finding echoes another related work by Morck et al. (2000) in which the surge of the ratio of firm-specific risk to systematic risk in the U.S. stock markets is documented. Since then, several studies try to offer possible explanations for this phenomenon. The proposed explanations include increasing leverage, higher incidence of spin-offs of conglomerates, firms issuing stocks earlier in their life-cycles, increase in option-based compensation (Campbell et al., 2001); increased proportion of institutional ownership and expected earnings growth (Xu and Malkiel, 2003); firm fundamentals having become more volatile (Wei and Zhang, 2006); newly listed firms becoming increasingly younger (Fink et al., 2010) and riskier (Brown and Kapadia, 2007); fundamental cash flow shocks due to product markets becoming more competitive (Irvine and Pontiff, 2009); trading of low-priced stocks by retail investors (Brandt et al., 2010); earnings management (Hutton et al., 2009) and deteriorating financial reporting quality (Rajgopal and Venkatachalam, 2011; Chen et al., 2012). The objective of this chapter is to investigate whether earnings quality and its components explain cross-sectional differences in firm-specific return volatility of Japanese manufacturing firms for the period 2003-2012. In particular, this study is motivated by Hutton et al. (2009) and Rajgopal and Venkatachalam (2011) finding that earnings opacity or deteriorating earnings quality is strongly associated with firm-specific return volatility in the cross-section of U.S. stocks. While the extant literature demonstrates a link between earnings quality and firm-specific return volatility, this study will also investigate the relation between firm-specific return volatility and two distinct components (innate versus discretionary component) of earnings quality to shed light on which component of earnings quality drives the association between earnings quality and firm-specific return volatility.

In Japanese stock markets, the behavior of aggregate firm-specific return volatility stands in sharp contrast to that of U.S. markets. Hamao et al. (2003) report a dramatic fall in firm-level volatility immediately after the market crash in the 1980s and an increase in market-wide volatility. They attribute this unusual structure of firm-specific return volatility to sharp increase in earnings homogeneity among Japanese firms post-crash period. The Japanese stock market has long been the second largest financial market in terms of market capitalization after U.S. markets (Chang et al., 2010). Given the contrasting behavior of firm-specific return volatility in the U.S. and the Japanese markets, the evidence from Japan is expected to enhance the robustness and assess the external validity of the results found in the U.S. markets. While Chang and Dong (2006) investigate the role of firm-level earnings in explaining cross-sectional differences in idiosyncratic volatility using Japanese data, I relate the more specific notion of "earnings quality" to cross-sectional differences in firm-specific return volatility.

5.2 Literature Review and Hypotheses Development

This section reviews prior literature on the relation between earnings quality and firm-specific return volatility and forms two hypotheses that will be tested in this chapter.

5.2.1 Earnings Quality and Firm-specific Return Volatility

Although the literature on determinants and consequences of earnings quality is abundant, studies that examine firm-specific return volatility effect of earnings quality are few, and the results are mixed. The mixed results are attributable to the different interpretation of what firm-specific return volatility captures. The nature and direction of the association between earnings quality and firm-specific return volatility are also related to a larger debate in accounting and finance literature on whether firm-specific return volatility reflects firm-specific information or noise.

Roll (1988) was the first to formalize the idea that stock return synchronicity (asynchronicity), a measure of firm-specific return volatility, is negatively (positively) associated with the amount of firm-specific information being impounded into individual stock price. Morck et al. (2000) find that synchronicity is higher in countries with less developed financial systems and weaker private property rights. Jin and Myers (2006) document positive associations between synchronicity and several measures of financial information opacity for a cross-section

of countries. Durnev et al. (2003), Ferreira and Laux (2007), and Hutton et al. (2009) find results similar to Jin and Myers (2006) in the U.S. context. These studies conclude that poor earnings quality is associated with lower firm-specific return volatility, measured by asynchronicity. That is, when earnings quality is low, less firm-specific information is available and synchronicity (asynchronicity) is higher (lower). It is interesting to note that prior studies that rely on information based explanation of return volatility invariably used R^2 based measure, and some studies interpret lower R^2 as equivalent to higher firm-specific return volatility.[16] If lower R^2 (higher asynchronicity) is associated with more firm-specific information and better information environment, and higher earnings quality is a key feature of better information environment (higher quality earnings is associated with lower PIN, lower bid-ask spread, and greater liquidity), I predict that higher earnings quality will be associated with higher asynchronicity. Thus, I propose the following hypothesis, stated in the alternative form:

Information Hypothesis (H3a): Earnings quality is positively associated with firm-specific return volatility.

In contrast, a parallel body of research argues that more firm-specific return volatility captures noisier stock prices (West, 1988; Teoh et al., 2008). Pastor and Veronesi (2003) model the relation between uncertainty about a firm's average profitability and return volatility, and show that higher uncertainty induces larger return volatility. If managers distort the reported earnings through discretionary choices, the resulting information risk can potentially increase investors' uncertainty about future profitability of the firm and thus affect return volatility. Rajgopal and Venkatachalam (2011) find that poor financial reporting quality is significantly associated with higher idiosyncratic volatility in cross-section and over time. Bartram et al. (2012) directly examine the relation between idiosyncratic return volatility and corporate disclosure quality and find a negative association between the two. Chen et al. (2012) examine the importance of managerial discretion in determining idiosyncratic volatility and show that idiosyncratic return volatility is negatively associated with information quality revealed in managerial discretion. The above-cited papers argue primarily for a negative association between earnings quality and firm-specific return volatility in the sense that high-quality earnings reduce

[16] One such study is Piotroski and Roulstone (2004) who argue that insiders may be more inclined to sell their shares if their firm's stock displays excessive idiosyncratic risk or low stock return synchronicity (p-1130).

firm-specific return volatility by eliminating informational uncertainty. Most of these studies use residual variance from an asset pricing model as a measure of firm-specific return volatility. If higher firm-specific return volatility represents more pricing error that is common in poor information environment, and lower earnings quality is symptomatic of poor information environment, it can be inferred that higher earnings quality will be associated with lower idiosyncratic volatility consistent with a noise-based explanation. This discussion leads to a competing hypothesis on the relation between earnings quality and firm-specific return volatility, stated in the alternative form:

Noise Hypothesis (H3b): Earnings quality is negatively associated with firm-specific return volatility.

5.2.2 Innate versus Discretionary Component of Earnings Quality and Firm-specific Return Volatility

The existing empirical studies suggest an association between total earnings quality and firm-specific return volatility. However, Francis et al. (2005) assert that earnings quality is driven not only by the discretionary reporting choices of the managers (discretionary component) but also by the innate features of the firm's business model and operating environment (innate component). Although there is no theoretical and empirical literature examining the impact of innate versus discretionary component of earnings quality on firm-specific return volatility that is expected to shed light on whether the observed association between earnings quality and firm-specific return volatility is primarily driven by the innate component or discretionary component or both, I form an intuition from Francis et al. (2005) who investigate the differential impact of innate versus discretionary component of accrual quality on the cost of equity. Literature on managerial discretion offers three competing views on the intent of exercising discretion (Holthausen, 1990) - to reveal managers' private information about the future prospects of a firm, to conceal the true underlying economic performance of the firm, and to minimize contracting costs amongst the various contracting parties. Guay et al. (1996) also recognize that discretionary accruals reflect a mixture of three distinct effects - managerial attempts to signal firm performance, earnings management, and pure noise. In a broad cross-section of firms, some managers will use accruals to convey private information while some managers will use accruals opportunistically (Healy, 1996). Thus, I expect that discretionary component of earnings quality

will reflect a blend of performance effect, opportunism, and noise. As a result of this, the net effect of management's discretionary choices could be positive, negative or neutral depending on which effect dominates. Considering this possibility, I expect that the effect of discretionary component will be less pronounced than that of innate component. My second hypothesis is based on the prediction of differential effects between innate and discretionary component of earnings quality, stated in alternative form:

H4: The innate component of earnings quality has larger impact on firm-specific return volatility than discretionary component of earnings quality

5.3 Variable Measurement

In this section, I explain measurement of two proxies for firm-specific return variation (idiosyncratic volatility and asynchronicity), two proxies for earnings quality (accruals quality and absolute abnormal accruals) and other control variables. Appendix B summarizes the measurement of each of these variables.

5.3.1 Firm-specific Return Volatility

Prior research uses either idiosyncratic volatility or asynchronicity as substitute measures of firm-specific return variation. Following prior research (Hutton et al., 2009; Rajgopal and Venkatachalam, 2011), I estimate both measures and describe the estimation procedure below in greater detail.

5.3.1.1 Idiosyncratic Volatility

The idiosyncratic volatility of a stock is not directly observable. Moreover, it is related to asset pricing models as it is estimated relative to the systematic volatility of the stock. This approach of estimating idiosyncratic volatility using residuals from an asset pricing model is more popular and widely used in the finance and accounting literature. I use the standard market model derived from CAPM to estimate idiosyncratic volatility:

$$R_i = \alpha_i + \beta_i R_m + e_i \qquad \text{Eq. (5.1)}$$

In equation (5.1), R_i is the return on stock i, and R_m is the return on a market index. I estimate above equation for every firm included in the sample for each year using daily firm-specific return data and return on market index over a period of 12 months ending on three months after fiscal year end in order to ensure that information about firm's earnings quality is available to the

market.[17] I use TOPIX return data as market return. I measure idiosyncratic volatility [σ_e^2] as the variance of the error term in equation (5.1). Specifically, [σ_e^2] is the variance of residuals from a firm-specific regression of stock returns on market index return on a daily basis over a 12 month period ending on three months after fiscal year t. Since the fiscal year end of most Japanese firms is March, return calculations begin at the end of June, three months after the fiscal year end. I take the natural logarithm of the idiosyncratic volatility measure for empirical analyses. A high value of idiosyncratic volatility implies greater firm-specific return volatility.

5.3.1.2 Asynchronicity

Roll (1988) was the first to formalize that R^2 from the market model or some of its variants can be used as a measure of stock return synchronicity. Several studies treat higher synchronicity as equivalent to lower idiosyncratic volatility (i.e., high R^2 from the market model is equivalent to low residual variance from the market model) and vice versa. Asynchronicity is the lack of synchronous movement of a firm's stock return with the market return and is measured using a transformed R^2 variable that captures the lack of return synchronicity ($1-R^2$). Since R^2 is bounded between zero and one, it creates complications for empirical estimation. I follow common practice in the literature (Morck et al., 2000; Hutton et al., 2009) and define asynchronicity using a logistic transformation of ($1-R^2$), which can range from negative to positive infinity:

$$\text{Asynchronicity } (\Phi) = \ln[(1-R^2)/R^2]$$

Here, R^2 is the coefficient of determination from the estimation of equation (5.1). The log transformation of R^2 creates an unbounded continuous variable out of a variable originally bounded by 0 and 1. Thus, a high value of asynchronicity indicates a high level of firm-specific return volatility.

5.3.2 Earnings Quality

I use two measures of earnings quality: Dechow and Dichev (2002) accrual quality (DDSTD) and Kasznik (1999) version of modified Jones (1991) absolute abnormal accruals (KZABS). These measures are described in greater detail below.

[17] I define the end of fiscal year as the end of third month after fiscal year end because Japanese firms are required to submit audited financial statements within three months of the fiscal year end.

5.3.2.1 Accrual Quality (DDSTD) Measure Based on Dechow and Dichev (2002) Model

My first measure of earnings quality is accrual quality (DDSTD), which is based on an approach proposed by Dechow and Dichev (2002) and implemented by Francis et al. (2005). This approach relies on the idea that working capital accruals reflect managers' anticipation of current and future cash flows realizations or reversal of past cash flows, and the ability of accruals to reflect such pattern could be severely affected by the estimation errors in accruals, regardless of management intent. Such estimation error could arise from managerial incentives to manipulate earnings or from environmental uncertainty and management lapses although the source of the error is not relevant in this approach. The ultimate aim of this method is to determine the extent of accruals estimation error in the mapping of accruals into past, present and future cash flows as modeled by Dechow and Dichev (2002):

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \nu_{i,t} \qquad \text{Eq. (5.2)}$$

where TCA is the total current accruals computed as $\Delta CA - \Delta CL - \Delta Cash + \Delta STDEBT$, ΔCA is the change in current assets, ΔCL is the change in current liabilities, $\Delta Cash$ is the change in cash, $\Delta STDEBT$ is the change in short-term debt included in current liabilities. CFO is the cash flows from operations calculated as NI-TCA+DEP, where NI is the net income, TCA is the total current accruals and DEP is the depreciation and amortization expense. Subscripts i and t are the firm and time subscripts, respectively.

McNichols (2002) proposes that adding changes in sales revenues and the level of property, plant and equipment lead to a better-specified model and improves the accrual quality measure. So, I augment equation (5.2) as follows (all variables excluding the intercept are scaled by average total assets):

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \nu_{i,t} \qquad \text{Eq. (5.2a)}$$

where ΔREV is the change in revenues and PPE is the gross value of property, plant and equipment. I estimate equation (5.2a) for every industry-year in each of 15 Nikkei two-digit industry groups in which I require at least 10 firms in each year. Finally, the earnings quality ($DDSTD_{i,t}$) metric is defined as the standard deviation of firm i's residuals, calculated over years t-4 through t, i.e., $DDSTD_{i,t} = \sigma(\upsilon_{i,t-4,t})$. Larger standard deviation of residuals indicates poor accruals and earnings quality.

5.3.2.2 Absolute Abnormal Accruals (KZABS) Based on Kasznik (1999) Version of Modified Jones (1991) Model

Another widely used accrual based measure of earnings quality is the absolute value of abnormal accruals generated by different versions of Jones (1991) approach. This measure relies on the association between accruals and accounting fundamentals to separate an accruals measure into normal and abnormal component. The portion of accruals, which is not well explained by firm fundamentals, is deemed abnormal, and such abnormal accruals are presumed to reduce the quality of accruals and earnings. To determine abnormal accruals, I apply Kasznik version of modified Jones (1991) model and estimate the following regression for each of 15 Nikkei two-digit industry groups with at least 10 firms in each year (all variables excluding the intercept are scaled by average total assets):

$$TA_{i,t} = \delta_0 + \delta_1(\Delta REV_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 \Delta CFO_{i,t} + \eta_{i,t} \qquad \text{Eq. (5.3)}$$

where TA is the firm i's total accruals, computed as TCA-DEP, TCA is the total current accruals, DEP is the depreciation and amortization expense, ΔREV is the change in revenues, ΔAR is the change in accounts receivable, PPE is the gross value of property, plant and equipment, and ΔCFO is the change in cash flows from operation. Equation (5.3) is a modified and extended version of Jones (1991) model, which describes total accruals as a function of the change in revenue and the level of property, plant and equipment. Following the suggestion of Dechow et al. (1995), Kasznik adjusts the sales revenue variable for the change in accounts receivable. Kasznik also includes the change in operating cash flows as an explanatory variable based on Dechow's (1994) finding that cash flow from operation is significantly negatively correlated with total accruals. I prefer Kasznik version over modified Jones version because the former version considers significant correlation between cash flows from operation and total accruals in addition to two fundamental accounting variables used by the latter version and results into higher adjusted R^2. I treat the residual, $\eta_{i,t}$, from equation (5.3) as abnormal accruals and use the absolute value of abnormal accruals, i.e., $KZABS_{i,t} = |\eta_{i,t}|$ as my second proxy for earnings quality. I interpret higher (lower) values of KZABS as measures of lower (higher) earnings quality.

5.3.3 Control Variables

In analyzing the relation between firm-specific stock return volatility and earnings quality, I attempt to account for two confounding factors that can cause changes in firm-specific return volatility (Rajgopal and Venkatachalam, 2011) and control for several variables that are posited to influence idiosyncratic volatility and asynchronicity, two proxies for firm-specific return variation, in the cross section.

5.3.3.1 Earnings Related Value Relevant Information

Idiosyncratic volatility can result from the firms' extended disclosure of earnings related value-relevant information (summary income statements, summary balance sheet and cash flow statement information, transitory earnings components, street earnings number etc.) around earnings announcement because increase in return volatility is positively associated with these concurrent disclosures (Francis et al., 2002; Collins et al., 2009). Following Rajgopal and Venkatachalam (2011), I control for the expanded dissemination of value-relevant disclosures by the squared annual buy and hold return (RET^2) which is likely to incorporate value-relevant information disseminated during the fiscal year.

5.3.3.2 Informativeness of Earnings Quality for Future Cash Flow

Rajgopal and Venkatachalam (2011) claim that an increase in earnings management reduces the precision of the earnings signal and is thus related to increased idiosyncratic return volatility. However, managerial discretion may improve the informativeness of earnings (Subramanyam, 1996). Badertscher et al. (2012) show that depending on the motivation to manage earnings, i.e., opportunistic versus informational reasons, accruals can be more or less informative about future cash flows. To account for the possibility that the relation between earnings quality and idiosyncratic return volatility could be attributable to informativeness of earnings quality for future cash flows (Rajgopal and Venkatachalam, 2011), I include the next year's operating cash flows (CFO_{t+1}) as a proxy for the information contained in earnings quality about future cash flows.

5.3.3.3 Cash Flows Volatility

Vuolteenaho (2002) shows that firm-level stock returns are a function of both expected return news and unexpected cash flow news. In other words, volatility of firm-specific stock

returns can be related to the volatility of cash flows. Wei and Zhang (2006) find that idiosyncratic volatility is related to volatility of accounting return on equity. Rajgopal and Venkatachalam (2011) control for the conditional variance in cash flows via the variability of cash flows (VCFO).[18] I measure the cash flows volatility as the standard deviation of cash flows from operation scaled by average total assets over the trailing five-year window and expect a positive relation between VCFO and stock return volatility.

5.3.3.4 Operating Performance

Based on the findings by Hanlon et al. (2004) that operating performance, defined either as earnings or operating cash flows scaled by total assets, is negatively associated with stock return volatility in the cross section, Rajgopal and Venkatachalam (2011) introduced lagged CFO as a control variable to proxy for operating performance. Hutton et al. (2009) control contemporaneous ROE as a measure of firm performance. Following their guide, I use accounting return on equity (ROE) as a control variable[19] and expect a negative relation between ROE and firm-specific stock return volatility. Wei and Zhang (2006) also find that accounting return on equity is negatively associated with idiosyncratic return volatility.

5.3.3.5 Firm Size

Pastor and Veronesi (2003) show that small firms experience higher return volatility. Hutton et al. (2009) show that larger firms operating in a wider cross section of the economy have higher R^2s. Hence, I control for firm size where SIZE is the natural logarithm of market capitalization.

5.3.3.6 Leverage

Rajgopal and Venkatachalam (2011) argues that levered firms are more likely to experience financial distress, suggesting a positive association between stock-return volatility and financial leverage in the cross-section. Hutton et al. (2009) posit that leverage affects the division of risk between equity and debt holders and thus is expected to affect R^2 through its

[18] I use standard deviation of earnings scaled by average total assets or lagged book value of equity instead of standard deviation of cash flows in the estimating equation and find that my results are not affected by these alternative variables. Callen and Segal (2004) extend Vuolteeenaho's (2002) variance decomposition framework to document that in addition to cash flow news, accruals explain return volatility. In unreported results, I control for accrual volatility in all empirical specifications and find that none of my inferences change.

[19] My inferences are unaltered whether I use operating cash flows or accounting return on assets (ROA) instead.

impact on the sensitivity of firm returns to macroeconomic conditions. Following previous studies, I define financial leverage (LEV) as the ratio of long-term debt to book value of total assets.

5.3.3.7 Book-to-market Ratio

Rajgopal and Venkatachalam (2011) contend that firms with greater growth opportunities are likely to experience greater stock return volatility. Hutton et al. (2009) argue that the market-to-book ratio places firms along a growth-versus-value spectrum and thus could be systematically related to R^2. I use book-to-market (BM) ratio as a proxy for growth firms where lower book-to-market ratio reflects higher growth opportunities and expect a negative relation between BM and firm-specific return volatility.

5.3.3.8 Stock Return Performance

Duffie (1995) shows that stock return performance and stock return volatility are inversely related with each other. Following Rajgopal and Venkatachalam (2011), I define firm stock returns (RET) as contemporaneous annual buy and hold returns.

5.3.3.9 Loss Firm

The frequency of losses has increased over the last five decades (Givoly and Hyan, 2000) reflecting either lower operating cash flows or significant negative accruals or a combination of the two. The quality of earnings is expected to be low for loss firms if the loss is predominantly driven by negative accruals as opposed to lower operating cash flows (Rajgopal and Venkatchalam, 2011). In that case, stock return volatility might be higher for loss firms. I use a dummy variable (LOSS) to capture the effect of reporting losses on return volatility. LOSS is set to one (zero otherwise) if the firm-year reports negative earnings.

5.3.3.10 Skewness and Kurtosis

Jin and Myers (2006) include contemporaneous skewness and kurtosis as control variables in their examination of R^2 and earnings opacity. Following their lead, Hutton et al. (2009) also add these variables as control variables in some of their regressions of asynchronicity on earnings opacity. I measure SKEW and KURT as the skewness and kurtosis of firm-specific daily returns and control these variables in all specifications.

5.4 Sample Selection and Descriptive Statistics

I discuss sample selection criteria and the summary statistics for all the variables in this section.

5.4.1 Sample Selection

The sample period for this study spans the period 2003-2012. My sample consists of 12,284 firm-year observations representing 1,490 individual firms across 15 industries that have the required data. Data for the dependent variable, variable of interest and control variables come from a variety of sources. Accounting data come from Nikkei NEEDS Financial Quest Database, and stock price and return data come from Nikkei Portfolio Master Return Database.[20] My sample consists of only manufacturing companies listed in any one of the Japanese Stock Exchanges (Tokyo, Osaka, Nagoya, JASDAQ, etc.) and primarily covers all firms from 15 industries based on Nikkei two-digit industrial codes. I do not include financial institutions, insurance companies, and firms in service industries since earnings quality empirical models used in this study do not reflect their activities. Because estimation of parameters for the Dechow and Dichev (2002) model requires lead and lag values of cash flows from operation and measures of earnings quality require five annual residuals, initially I collect necessary data for the 18-year period (1996-2013) to compute earnings quality measures. After restricting my sample to firms with complete data for all the dependent, independent and control variables by eliminating firm-years due to missing information on any of the variables, I end up with 12,284 firm-year observations for the final sample period. All of my empirical analyses are based on 12,284 firm-years.

5.4.2 Descriptive Statistics

Table 5.1.1 reports summary statistics on the key variables used in the study. I winsorize all the variables at the 1 and 99 percent levels to avoid the effects of influential outliers. Panel A of Table 5.1.1 shows that the mean (median) idiosyncratic volatility (after log transformation) based on the traditional CAPM model is about 1.47 (1.44) whereas the mean (median)

[20] Nikkei NEEDS Financial Quest Database and Nikkei Portfolio Master Return Database in Japan correspond to Compustat and CRSP in the U.S., respectively.

asynchronicity based on R^2 from CAPM model is about 2.16 (1.65).[21] The correlation between two measures of firm-specific return volatility, reported in Table 5.1.2, is moderate at 0.24 implying that two measures might capture different aspect of the same construct and emphasizing the need to use both measures as proxies for firm-specific return volatility. Table 5.1.1, Panel B and C, provides descriptive information on two earnings quality measures and their innate and discretionary components and the eight determinants that comprise the innate component of earnings quality. I find that the variability of earnings quality measure based on DD accrual quality model is less than that of earnings quality measure based on KZ absolute abnormal accrual model. The correlation (tabulated in Table 5.1.2) between the two proxies of earnings quality is 0.45 over the sample period. The correlation is not high enough to make one of these proxies redundant. Therefore, I consider both proxies in empirical analysis.

The mean (median) value of the innate component is 0.023 (0.021) for DDSTD and 0.027 (0.025) for KZABS, compared to a zero mean (-0.003 median) value of discretionary component for DDSTD and a zero mean (-0.006 median) value of discretionary component for KZABS. The zero mean value of DiscEQ is expected given that the discretionary component is defined as the prediction error from (5.8). For the innate determinants, the sample mean values for the first five variables are 10.782 for total assets (log of total assets), 0.046 for cash flows volatility, 0.083 for sales volatility, 5.068 for operating cycle (or 156 days) and 20 percent for negative earnings incidence. The variable capturing intangibles intensity shows that only 2.6 percent of the sample firm-years report zero expenditure on R&D and advertising. For all sample firm-years (including those with INTAN = 0), the mean value of INTAN is 3.4 percent. Finally, the mean value of CAPITAL is 32.1 percent. The average firm has a market capitalization of 129,569 million yen (untabulated), a book-to-market ratio of about 1.311, significant operating cash flows as a percentage of average total assets (5.3%), return on equity of 2.4% and financial leverage of 20.6% of average total assets (Panel D, Table 5.1.1).

[21] Unreported result shows that the mean (median) R^2 from traditional CAPM based market model is 0.20 (0.16) for the sample period. This weak fit of the market model is in line with previous studies conducted in U.S. context. For example, Piotroski and Roulstone (2004) observe that the mean (median) R^2 from the estimation of modified market model is 0.19 (0.15). However, despite weak association between firm return and market return, these R^2s (and the related asynchronicity metric) exhibit substantial cross-sectional variation.

Table 5.1.1: Descriptive Statistics

This table reports the descriptive statistics of all the variables used for this study. All variables are winsorized at the bottom and top 1% levels. For the variables used in the regressions, the number of observations is 12,284 for the sample period 2003-2012. All variables are defined in Appendix B.

Variable		Mean	Std. Dev.	10%	Q1	Median	Q3	90%
Panel A: *Volatility measures*								
Idiosyncratic volatility	$[\sigma_e^2]$	1.474	0.828	0.425	0.894	1.437	2.023	2.572
Asynchronicity	Φ	2.162	1.895	0.185	0.768	1.651	3.152	5.11
Beta squared	$[\beta^2]$	0.730	0.722	0.019	0.141	0.537	1.111	1.721
Panel B: *Earnings quality measures*								
Dechow-Dichev accrual quality	DDSTD	0.022	0.015	0.008	0.012	0.018	0.028	0.041
Innate component	InnateEQ	0.023	0.008	0.014	0.017	0.021	0.027	0.033
Discretionary component	DiscEQ	-0.000	0.013	-0.013	-0.008	-0.003	0.004	0.014
Kasznik absolute abnormal accrual	KZABS	0.026	0.024	0.003	0.009	0.019	0.036	0.057
Innate component	InnateEQ	0.027	0.009	0.018	0.021	0.025	0.031	0.037
Discretionary component	DiscEQ	-0.000	0.024	-0.023	-0.016	-0.006	0.009	0.028
Panel C: *EQ determinants*								
Total assets (in log)	ASSET	10.782	1.511	9.071	9.708	10.574	11.643	12.865
Cash flows volatility	VCFO	0.046	0.032	0.018	0.026	0.038	0.057	0.083
Sales volatility	VSALES	0.083	0.072	0.026	0.039	0.064	0.103	0.162
Operating Cycle (in log)	OPCYCLE	5.068	0.416	4.522	4.835	5.096	5.336	5.547
Incidence of negative earnings	NEG	0.202	0.245	0.000	0.000	0.200	0.400	0.600
Intangible intensity	INTAN	0.034	0.091	0.003	0.010	0.023	0.043	0.075
Absence of reported intangible	INTANDUM	0.026	0.159					
Capital intensity	CAPITAL	0.321	0.129	0.161	0.228	0.314	0.404	0.492
Panel D: *Control Variables*								
Earnings related value-relevant information	RET^2	0.226	0.528	0.002	0.012	0.058	0.191	0.505
Informativeness of earnings quality for future cash flows	CFO	0.053	0.059	-0.011	0.025	0.056	0.086	0.118
Operating performance	ROE	0.024	0.132	-0.077	0.009	0.042	0.080	0.126
Firm size (in log)	SIZE	9.898	1.793	7.789	8.575	9.677	10.990	12.397
Leverage	LEV	0.206	0.169	0.002	0.054	0.178	0.323	0.448
Book-to-market ratio	BM	1.311	0.848	0.480	0.722	1.097	1.653	2.432
Stock return performance	RET	0.091	0.468	-0.394	-0.205	0.000	0.278	0.689
Loss firms	LOSS	0.201	0.401	0.000	0.000	0.000	0.000	1.000
Return skewness	SKEW	0.381	0.977	-0.625	-0.105	0.274	0.780	1.559
Return kurtosis	KURT	6.491	7.508	0.82	1.814	3.821	8.126	15.555

Table 5.1.2 Correlation Matrix

The table presents Pearson correlation coefficients among dependent variables and variables of interest for this study. The number of observations used to calculate correlation coefficients is 12,284. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively. All variables are defined in Appendix B.

Variable	$\ln[\sigma_e^2]$	$[\Phi]$	$\ln[\beta^2]$	DDSTD	KZABS
$\ln[\sigma_e^2]$	1				
$[\Phi]$	0.2428***	1			
$\ln[\beta^2]$	0.0751***	-0.8758***	1		
DDSTD	0.2714***	0.0469***	0.0876***	1	
KZABS	0.1719***	0.0517***	0.0273***	0.4507***	1

Table 5.1.2 reports Pearson correlation coefficients among key variables. Consistent with prior literature, all the correlation coefficients between two measures of firm-specific return variability (idiosyncratic volatility and asynchronicity) and two inverse measures of earnings quality (DDSTD and KZABS) are significantly positive suggesting that better quality earnings reduce firm-specific return volatility. The correlation between idiosyncratic volatility (asynchronicity) and DDSTD is 0.271 (0.047) while the correlation between idiosyncratic volatility (asynchronicity) and KZABS is 0.172 (0.052). Moreover, both the inverse measures of earnings that provide high-quality earnings information enjoy lower systematic risk. Finally, the correlations between two measures of firm-specific return volatility and beta ($\ln[\beta^2]$) are surprisingly opposite in that idiosyncratic volatility is marginally positively correlated with beta but asynchronicity is strongly negatively correlated with beta.

5.5 Empirical Results

In this section, I present the results of three sets of analyses. First, I try to validate the assumption of what firm-specific return volatility captures by relating it with known characteristics of firm's information environment. Second, I present and discuss the results of multivariate regression analysis used to study the relation between firm-specific return volatility and earnings quality. Third, I explore the relation of firm-specific return volatility with two distinct components of earnings quality.

5.5.1 Empirical Test of the Relation between Firm-specific Return Volatility and Information Environment

I compute the following proxies for the firm's information environment: bid-ask spread, illiquidity measure (Amihud 2002), volatility of the Amihud (2002) liquidity measure,

institutional ownership and zero return days. The description of each of these variables is given in Appendix B. If the interpretation that higher volatility represents greater informational efficiency of stock market is correct, I should find that firms with higher volatility are characterized by lower spread, lower illiquidity and liquidity risk, higher institutional ownership, and less zero return days. In contrast, if higher volatility reflects noisy stock prices, then I should find the opposite. I form quintile portfolios sorted on both measures of firm-specific return volatility and investigate whether the characteristics of liquidity and other information environment proxies in the extreme portfolios behave in a manner consistent with noise or news. Results presented in Panels A and B of Table 5.2 are consistent with the noise hypothesis not the information hypothesis. Regardless of the measures of firm-specific return volatility on the basis of which quintile portfolios are formed, firms in the highest quintile portfolio exhibit greater levels of SPREAD, ILLIQUID, ILLIQVOL, ZRDAYS, and lower level of INSTITUTE relative to the lowest quintile portfolio. In fact, each of the information environment variables increases monotonically across the quintile portfolios of firm-specific return volatility. This is strong evidence that higher levels of $\ln[\sigma_e^2]$ and Φ are more symptomatic of noise in returns rather than firm-specific information is being impounded in stock prices.

Table 5.2: Information Environment Variables across Quintiles of Idiosyncratic Volatility and Asynchronicity

Panel A and B report the averages for each variable capturing different aspects of firms' information environment in quintile portfolios formed on idiosyncratic volatility and asynchronicity covering the period 2003-2012. Quintile portfolios are formed each fiscal year separately for the two measures of firm-specific return volatility ($\ln[\sigma_e^2]$ and Φ). For Panels C and D, I provide the mean difference in Quintile 5 – Quintile 1 portfolios for each information environment variable across different size quintiles with size (log transformation of market capitalization) measured at *t-1*. *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Panel A: Mean of information environment variables across quintiles of idiosyncratic volatility ($\ln[\sigma_e^2]$)

Variable	Quintiles based on $\ln[\sigma_e^2]$					Mean diff.	(t-
	(1)	(2)	(3)	(4)	(5)	(5) – (1)	statistic)
SPREAD	0.006	0.007	0.010	0.013	0.020	0.014***	(23.82)
ILLIQUID	0.033	0.052	0.091	0.147	0.289	0.256***	(27.16)
ILLIQVOL	0.056	0.091	0.161	0.263	0.532	0.476***	(27.29)
INSTITUTE	21.023	22.271	18.642	13.852	7.900	-13.124***	(-30.12)
ZRDAYS	0.144	0.149	0.165	0.186	0.210	0.066***	(12.76)

Panel B: Mean of information environment variables across quintiles of asynchronicity (Φ)

Variable	Quintiles based on Φ					Mean diff.	(t-
	(1)	(2)	(3)	(4)	(5)	(5) – (1)	statistic)
SPREAD	0.005	0.007	0.010	0.018	0.029	0.024***	(29.21)
ILLIQUID	0.002	0.010	0.039	0.182	0.379	0.377***	(41.88)
ILLIQVOL	0.003	0.013	0.070	0.345	0.672	0.669***	(40.29)
INSTITUTE	31.709	22.732	15.606	8.893	4.647	-27.062***	(-70.44)
ZRDAYS	0.052	0.071	0.100	0.209	0.412	0.360***	(82.15)

Panel C: Mean difference of information environment variables between Quintile 5 and Quintile 1 portfolios of idiosyncratic volatility ($\ln[\sigma_e^2]$) by each size quintile

Variable	Quintile based on $\ln[\sigma_e^2]$	Size Quintile				
		(1)	(2)	(3)	(4)	(5)
SPREAD	1	0.016	0.008	0.006	0.004	0.003
	5	0.033	0.030	0.023	0.017	0.009
	Difference (5-1)	0.017***	0.022***	0.017***	0.013***	0.006***
	(*t*-statistic)	(6.43)	(16.88)	(13.85)	(13.10)	(16.74)
ILLIQUID	1	0.121	0.033	0.009	0.001	0.000
	5	0.673	0.394	0.230	0.121	0.028
	Difference (5-1)	0.552***	0.361***	0.221***	0.120***	0.028***
	(*t*-statistic)	(20.07)	(17.00)	(13.09)	(9.45)	(5.13)
ILLIQVOL	1	0.207	0.059	0.014	0.002	0.000
	5	1.230	0.707	0.425	0.240	0.058
	Difference (5-1)	1.023***	0.648***	0.411***	0.238***	0.058***
	(*t*-statistic)	(20.57)	(16.68)	(12.91)	(9.10)	(4.71)
INSTITUTE	1	4.895	11.885	18.418	28.918	40.806
	5	2.247	2.495	4.450	9.188	21.051
	Difference (5-1)	-2.648***	-9.390***	-13.968***	-19.730***	-19.755***
	(*t*-statistic)	(-6.15)	(-18.52)	(-21.80)	(-24.13)	(-21.70)
ZRDAYS	1	0.288	0.153	0.086	0.049	0.043
	5	0.322	0.275	0.211	0.154	0.088
	Difference (5-1)	0.034***	0.122***	0.125***	0.105***	0.045***
	(*t*-statistic)	(5.11)	(11.39)	(16.02)	(17.39)	(8.56)

Panel D: Mean difference of information environment variables between Quintile 5 and Quintile 1 portfolios of asynchronicity (Φ) by each size quintile

Variable	Quintile based on Φ	Size Quintile				
		(1)	(2)	(3)	(4)	(5)
SPREAD	1	0.007	0.005	0.004	0.004	0.003
	5	0.045	0.034	0.032	0.029	0.018
	Difference (5-1)	0.038***	0.029***	0.028***	0.025***	0.015***
	(*t*-statistic)	(17.43)	(18.79)	(14.22)	(16.01)	(11.26)
ILLIQUID	1	0.008	0.002	0.001	0.000	0.000
	5	0.713	0.409	0.369	0.268	0.139
	Difference (5-1)	0.705***	0.407***	0.368***	0.268***	0.139***
	(*t*-statistic)	(27.91)	(22.55)	(19.59)	(17.59)	(13.12)
ILLIQVOL	1	0.010	0.002	0.001	0.000	0.000
	5	1.207	0.705	0.665	0.492	0.295
	Difference (5-1)	1.197***	0.703***	0.664***	0.492***	0.295***
	(*t*-statistic)	(26.64)	(20.67)	(18.22)	(16.31)	(12.32)
INSTITUTE	1	15.203	24.760	33.306	40.161	45.059
	5	2.053	2.184	2.808	4.064	12.119
	Difference (5-1)	-13.150***	-22.575***	-30.498***	-36.097***	-32.940***
	(*t*-statistic)	(-24.33)	(-36.33)	(-47.615)	(-57.92)	(-35.69)
ZRDAYS	1	0.082	0.059	0.042	0.037	0.038
	5	0.447	0.446	0.437	0.416	0.312
	Difference (5-1)	0.365***	0.387***	0.395***	0.379***	0.274***
	(*t*-statistic)	(36.74)	(43.12)	(44.54)	(39.48)	(27.89)

Following Li et al. (2014), I examine whether the findings in Panels A and B are stable across various size quintiles because Roll (1988) finds that firm size is significantly correlated with R^2. Specifically, I create five size quintiles within each measure of firm-specific return volatility quintile portfolio. I then examine whether the information environment variables behave similarly across each of the size quintiles. Results reported in Panels C and D show that initial findings are robust to controlling for size. Across each of the size quintiles the higher firm-specific return volatility, irrespective of its proxies, is associated with higher bid-ask spread, higher illiquidity, lower institutional ownership and more zero return days. The differences in information environment variables between extreme quintiles of idiosyncratic volatility and asynchronicity within each size quintile are statistically significant.

5.5.2 Empirical Test of the Relation between Firm-specific Return Volatility and Earnings Quality

Prior studies rely on two proxies of firm-specific return volatility: (1) idiosyncratic volatility, often measured as the variance of the residual from a regression of individual stock return on market return; and (2) asynchronicity, operationalized as the inverse of R^2 from the market model. These two measures are used interchangeably in the literature. Following prior literature, I use both the measures as proxies for firm-specific return volatility as the dependent variable and estimate the following cross-sectional regression that relates these proxies of firm-specific return volatility with two proxies of earnings quality after incorporating the control variables identified in Section 5.3.3 in order to test my first hypothesis:

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.4)}$$

Where, VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) estimated using the market model (CAPM). EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model (DDSTD) and Kasznik version of modified Jones (1991) model (KZABS) and all other variables are defined in Appendix B. Following Rajgopal and Venkatachalam (2011), I lag EQ by one year relative to VOL to avoid picking up mere contemporaneous associations between firm-specific return volatility and earnings quality. I estimate equation (5.4) as a pooled cross-sectional regression and calculate *t*-statistics on the basis of two-way clustered robust standard errors (Gow et al., 2010; Petersen, 2009).

Table 5.3: Regression of Traditional CAPM Based Idiosyncratic Volatility, Asynchronicity and Beta on Earnings Quality and Other Control Variables

This table reports estimation of Eq. (5.4)

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.4)}$$

where VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$), asynchronicity (Φ) and beta ($\ln[\beta^2]$) estimated using market model (CAPM). EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of modified Jones (1991) model. All other variables are defined in Appendix B. The sample period is 2003-2012 and consists of 12,284 observations for all models. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

		Idiosyncratic Volatility ($\ln[\sigma_e^2]$)		**Asynchronicity (Φ)**		**Beta Squared $\ln[\beta^2]$**	
Variable	Expected Sign	EQ=DDSTD measure	EQ=KZABS measure	EQ=DDSTD measure	EQ=KZABS measure	EQ=DDSTD measure	EQ=KZABS measure
$EQ_{i,t-1}$	(+/-)	6.384*** (9.53)	2.087*** (6.58)	-11.873*** (-8.12)	-1.103 (-1.50)	19.090*** (11.15)	2.944*** (3.38)
$RET^2_{i,t-1}$	(+)	0.069** (2.29)	0.076** (2.52)	-0.112* (-1.77)	-0.127** (-1.98)	0.440*** (6.99)	0.462*** (7.26)
$CFO_{i,t+1}$	(-)	-0.011 (-0.07)	-0.060 (-0.37)	0.424 (1.50)	0.521* (1.85)	-1.031*** (-3.03)	-1.185*** (-3.50)
$VCFO_{i,t-1}$	(+)	1.109*** (3.94)	2.085*** (7.82)	3.793*** (7.33)	1.212** (2.37)	-2.226*** (-3.66)	1.601*** (2.73)
$ROE_{i,t-1}$	(-)	0.042 (0.48)	0.046 (0.52)	-0.059 (-0.35)	-0.006 (-0.03)	-0.119 (-0.62)	-0.179 (-0.93)
$SIZE_{i,t-1}$	(-)	-0.150*** (-18.11)	-0.154*** (-18.78)	-0.652*** (-33.21)	-0.644*** (-32.84)	0.533*** (23.73)	0.521*** (23.11)
$LEV_{i,t-1}$	(+)	0.932*** (15.84)	0.963*** (16.22)	-0.849*** (-7.04)	-0.898*** (-7.46)	1.757*** (12.45)	1.840*** (13.07)
$BM_{i,t-1}$	(-)	0.026 (1.25)	0.019 (0.88)	-0.058 (-1.64)	-0.043 (-1.20)	0.009 (0.21)	-0.015 (-0.32)
$RET_{i,t}$	(-)	-0.100 (-1.28)	-0.096 (-1.21)	-0.091 (-1.03)	-0.096 (-1.05)	0.469*** (6.15)	0.478*** (5.95)
$LOSS_{i,t-1}$	(+)	0.256*** (8.22)	0.266*** (8.56)	-0.087 (-1.40)	-0.117* (-1.83)	0.312*** (4.56)	0.357*** (5.08)
$SKEW_{i,t}$	(+)	0.233*** (14.41)	0.236*** (14.31)	0.072 (0.94)	0.065 (0.85)	0.190** (2.31)	0.201** (2.41)
$KURT_{i,t}$	(+)	-0.003 (-1.23)	-0.003 (-1.27)	0.021** (2.00)	0.021** (2.01)	-0.031*** (-2.67)	-0.032*** (-2.67)
Intercept		2.412*** (19.45)	2.498*** (20.24)	8.815*** (31.97)	8.616*** (31.29)	-7.240*** (-21.79)	-6.940*** (-20.85)
N		12,284	12,284	12,284	12,284	12,284	12,284
Adjusted R^2		39.67%	39.17%	39.71%	39.20%	27.28%	26.20%

Table 5.3 presents the results of estimating Eq. (5.4) using two proxies of earnings quality. Here, I use idiosyncratic volatility and asynchronicity as the dependent variable. The result shows that the coefficient on EQ is positive and statistically significant for both measures

of earnings quality when idiosyncratic volatility is used as the dependent variable. This finding is consistent with the noise hypothesis suggesting that the higher the earnings quality the lower the idiosyncratic volatility. When I use asynchronicity instead of idiosyncratic volatility as the dependent variable, I find negative and significant coefficient for DDSTD measure and negative coefficient for KZABS measure suggesting that the higher the earnings quality, the higher the asynchronicity. This finding is consistent with information hypothesis. Overall, the results are incongruous when I use two different but commonly used or often interchangeable measures of firm-specific return volatility as dependent variable keeping the independent variables unaltered. Asynchronicity supports information hypothesis but idiosyncratic volatility favors noise hypothesis. The discordant finding raises two concerns: (1) whether asynchronicity and idiosyncratic volatility do capture the same underlying construct, or (2) if asynchronicity and idiosyncratic volatility capture the same underlying construct, what could be the plausible reason for the conflicting result researchers often obtain? Li et al. (2014) resolve the inconsistency by showing that both asynchronicity and idiosyncratic volatility are higher in firms with poor information environment which are inconsistent with the common interpretation that firms with high asynchronicity or idiosyncratic volatility have more firm-specific information being impounded into stock price. They also explain why a negative coefficient implying positive association between asynchronicity and earnings quality is obtained by decomposing asynchronicity into three components. In particular, they demonstrate the role of individual component of R^2 in reconciling the contradictory findings of the literature when two apparently similar measures of firm-specific return volatility are used as dependent variable. Starting with the standard market model [Eq. (5.1)] and using simple arithmetic, they decompose asynchronicity (Φ), a measure of firm-specific return volatility based on logarithmic transformation of inverse of R^2, into three components:

$$\text{Asynchronicity } (\Phi) = \ln[(1-R^2)/R^2] = \ln[\sigma_e^2] - \ln[\beta^2] - \ln[\sigma_{rm}^2] \qquad \text{Eq. (5.5)}$$

The above equation shows that any increase in asynchronicity, Φ, can occur because of any or all of three factors: (i) an increase in idiosyncratic risk (σ_e^2), (ii) a decrease in beta (β^2), and (iii) a decrease in market-wide return volatility (σ_{rm}^2). Since volatility of market return (σ_{rm}^2) is a cross-sectional constant in a firm-level analysis within a country for a given year, equation (5.5) reduces to:

$$\text{Asynchronicity } (\Phi) = \ln[(1-R^2)/R^2] = \ln[\sigma_e^2] - \ln[\beta^2] \qquad \text{Eq. (5.6)}$$

Thus, a positive association between Φ and earnings quality can arise if idiosyncratic return volatility (σ_e^2) across firms is positively associated with earnings quality; β across firms is negatively related to earnings quality; or the negative correlation between β and earnings quality outweighs the negative correlation between σ_e^2 and earnings quality. Following Li et al. (2014), since σ_{rm}^2 is a cross-sectional constant for a given year but beta varies across firms, I use only beta ($\ln[\beta^2]$) as the dependent variable in Eq. (5.4) to examine the relation between this component of asynchronicity and my variable of interest. The $\ln[\beta^2]$ column in Table 5.3 shows that the coefficient on DDSTD and KZABS is positive and statistically significant when $\ln[\beta^2]$ is the dependent variable. More important, the positive coefficient on DDSTD and KZABS in the $\ln[\beta^2]$ regression is greater than the positive coefficient on DDSTD and KZABS in the $\ln[\sigma_e^2]$ regression. Thus, consistent with Li et al. (2014), I conclude that the negative coefficient on DDSTD and KZABS when asynchronicity is the dependent variable is driven by the dominant impact of earnings quality on beta relative to the impact of earnings quality on idiosyncratic volatility. Note that DDSTD and KZABS represent inverse measures of earnings quality and thus a positive (negative) coefficient implies negative (positive) association between dependent and independent variables.

Li et al. (2014) recommend two non-mutually exclusive solutions when the results using idiosyncratic volatility and asynchronicity are not consistent: (i) triangulate results with measures of poor information environment; and (ii) control for firm-year beta in cross-sectional settings. In section 5.5.1, I show that both measures of firm-specific return volatility are associated with characteristics of poor information environment, supporting noise hypothesis. Here, I use the second approach and re-estimate the regressions reported in Table 5.4 after controlling for firm-specific beta. Specifically, I estimate the following pooled cross-sectional regression:

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \alpha_{13} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.7)}$$

where VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) estimated using market model (CAPM). EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model (DDSTD) and Kasznik version of modified Jones (1991) model (KZABS) and all other variables are defined in Appendix B.

Table 5.4: Regression of Traditional CAPM Based Idiosyncratic Volatility and Asynchronicity on Earnings Quality and Other Control Variables after Controlling for Beta

This table reports estimation of Eq. (5.7)

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \alpha_{13} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.7)}$$

where VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) estimated using market model (CAPM). EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of modified Jones (1991) model. All other variables are defined in Appendix B. The sample period is 2003-2012 and consists of 12,284 observations for all models. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

		Idiosyncratic Volatility ($\ln[\sigma_e^2]$)		**Asynchronicity (Φ)**	
Variable	Expected Sign	EQ = DDSTD measure	EQ = KZABS measure	EQ = DDSTD measure	EQ = KZABS measure
$EQ_{i,t-1}$	(+/-)	4.639*** (7.38)	1.809*** (6.15)	2.534*** (3.99)	1.114*** (3.62)
$RET^2_{i,t-1}$	(+)	0.029 (1.09)	0.032 (1.22)	0.220*** (9.30)	0.222*** (9.31)
$CFO_{i,t+1}$	(-)	0.083 (0.52)	0.052 (0.33)	-0.355** (-2.05)	-0.371** (-2.14)
$VCFO_{i,t-1}$	(+)	1.312*** (4.73)	1.933*** (7.48)	2.113*** (7.70)	2.418*** (9.37)
$ROE_{i,t-1}$	(-)	0.053 (0.65)	0.062 (0.77)	-0.149** (-2.24)	-0.141** (-2.14)
$SIZE_{i,t-1}$	(-)	-0.199*** (-25.77)	-0.204*** (-26.63)	-0.249*** (-30.63)	-0.252*** (-31.19)
$LEV_{i,t-1}$	(+)	0.771*** (12.90)	0.789*** (13.11)	0.477*** (7.51)	0.487*** (7.70)
$BM_{i,t-1}$	(-)	0.025 (1.31)	0.020 (1.03)	-0.051*** (-2.86)	-0.054*** (-3.00)
$RET_{i,t}$	(-)	-0.143* (-1.93)	-0.141* (-1.89)	0.263*** (5.29)	0.264*** (5.34)
$LOSS_{i,t-1}$	(+)	0.227*** (7.85)	0.233*** (8.10)	0.149*** (4.40)	0.151*** (4.52)
$SKEW_{i,t}$	(+)	0.215*** (14.47)	0.217*** (14.42)	0.216*** (11.23)	0.216*** (11.26)
$KURT_{i,t}$	(+)	0.000 (0.03)	0.000 (0.04)	-0.002 (-0.90)	-0.002 (-0.90)
$\ln[\beta^2]_{i,t}$	(+/-)	0.091*** (11.77)	0.094*** (12.26)	-0.755*** (-76.84)	-0.753*** (-77.34)
Intercept		3.078*** (27.12)	3.153*** (28.13)	3.351*** (29.91)	3.390*** (30.78)
N		12,284	12,284	12,284	12,284
Adjusted R^2		43.35%	43.16%	87.65%	87.64%

Results reported in Table 5.4 show that the relation between inverse earnings quality and idiosyncratic volatility continues to be positive, despite the strong positive relation between beta

and idiosyncratic volatility. However, the relation between inverse earnings quality and asynchronicity changes signs from negative to positive for both measures of earnings quality and the coefficients become statistically significant also. The evidence in Table 5.4 suggests that the inclusion of beta resolves the inconsistency in findings when using idiosyncratic volatility and asynchronicity as alternative measures of firm-specific return volatility. The positive and significant coefficients indicate that the firm-specific return volatility captures noise in return, not firm-specific information being impounded into stock price.

5.5.3 Empirical Test of the Relation between Firm-specific Return Volatility and Two Distinct Components of Earnings Quality

Testing the second hypothesis requires estimates of innate and discretionary component of earnings quality. The innate component of earnings quality is determined by operational uncertainty and business model whereas discretionary component is driven by management's discretionary choices and judgments. Francis et al. (2005) suggested two methods to investigate the differential impact of innate versus discretionary component of earnings quality. Under the first method (Method 1), a measure of earnings quality is regressed on innate factors that prior researchers believe describe the firm's business model and its operating environment. For this purpose, I use eight innate factors such as total assets (ASSET), cash flows volatility (VCFO), sales volatility (VSALES), length of operating cycle (OPCYCLE), incidence of negative earnings realizations (NEG), intangible intensity (INTAN), intangible dummy (INTANDUM) and capital intensity (CPITAL) as outlined in Francis et al. (2005) and Francis et al. (2004). The detailed measurement of each of these variables is given in Appendix B. Method 1 estimates the following equation annually:

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \quad \text{Eq. (5.8)}$$

The fitted values from equation (5.8) generate an estimate of the innate component of earnings quality and the residuals from equation (5.8) are the estimate of the discretionary component of earnings quality. This method yields distinct estimates for each of the two components of earnings quality and allows for direct comparison between these two components.

In order to test my second hypothesis, I estimate the following regression of two proxies of firm-specific return volatility on two distinct components of both earnings quality measures after controlling for other determinants of firm-specific return volatility identified in Section 5.3.3:

$$VOL_{i,t} = \alpha_0 + \alpha_1 InnateEQ_{i,t-1} + \alpha_2 DiscEQ_{i,t-1} + \alpha_3 RET^2_{i,t-1} + \alpha_4 CFO_{i,t+1} + \alpha_5 VCFO_{i,t-1} + \alpha_6 ROE_{i,t-1} + \alpha_7 SIZE_{i,t-1} + \alpha_8 LEV_{i,t-1} + \alpha_9 BM_{i,t-1} + \alpha_{10} RET_{i,t} + \alpha_{11} LOSS_{i,t-1} + \alpha_{12} SKEW_{i,t} + \alpha_{13} KURT_{i,t} + \alpha_{14} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.9)}$$

where, VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) estimated using market model (CAPM). InnateEQ and DiscEQ are fitted values and residuals from equation (5.8) respectively. All other variables are described in Appendix B. According to my hypothesis, I conjecture that InnateEQ will have larger effect on firm-specific return volatility than DiscEQ. An evidence that α_1 is significantly larger than α_2 from equation (5.9) will support my second hypothesis. I include both components of earnings quality in the same model to ensure that the effect of one component on return volatility remains significant even after controlling for the effect of other.[22] I also control beta in the regression because the results in Table 4 underscore the importance of controlling beta when asynchronicity is used as dependent variable.

Table 5.5, column Method 1, reports the result of the estimation of Eq. (5.9). The result shows that the coefficients on InnateEQ and DiscEQ for both measures of earnings quality are positive and significant at 1 percent level for idiosyncratic volatility and asynchronicity. Consistent with my hypothesis, I find that InnateEQ has larger impact on idiosyncratic volatility and asynchronicity than DiscEQ as the coefficient of InnateEQ is significantly greater than the coefficient of DiscEQ for both DDSTD and KZABS measure (F-stat is reported at the bottom of Table 5.5, column Method 1). Overall, the results suggest that firm-specific return volatility is higher for firms with poor earnings quality that is driven by innate factors relative to managerial discretion.

[22] In an unreported result, I also include each component individually and find significant effect of each.

Table 5.5: Regression of Traditional CAPM Based Idiosyncratic Volatility and Asynchronicity on Innate and Discretionary Components of Earnings Quality after Controlling for Beta

This table reports estimation of Eq. (5.9) and Eq. (5.10)

$$VOL_{i,t} = \alpha_0 + \alpha_1 InnateEQ_{i,t-1} + \alpha_2 DiscEQ_{i,t-1} + \alpha_3 RET^2_{i,t-1} + \alpha_4 CFO_{i,t+1} + \alpha_5 VCFO_{i,t-1} + \alpha_6 ROE_{i,t-1} + \alpha_7 SIZE_{i,t-1} + \alpha_8 LEV_{i,t-1} + \alpha_9 BM_{i,t-1} + \alpha_{10} RET_{i,t} + \alpha_{11} LOSS_{i,t-1} + \alpha_{12} SKEW_{i,t} + \alpha_{13} KURT_{i,t} + \alpha_{14} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.9)}$$

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \alpha_{13} VSALES_{i,t-1} + \alpha_{14} OPCYCLE_{i,t-1} + \alpha_{15} NEG_{i,t-1} + \alpha_{16} INTAN_{i,t-1} + \alpha_{17} INTANDUM_{i,t-1} + \alpha_{18} CAPITAL_{i,t-1} + \alpha_{19} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.10)}$$

where VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) estimated using market model (CAPM). InnateEQ is the fitted value from Eq. (5.8) and DiscEQ is the residual from Eq. (5.8).

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \quad \text{Eq. (5.8)}$$

where EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of modified Jones (1991) model. InnateEQ and DiscEQ are inverse measure of innate and discretionary earnings quality respectively. All other variables are defined in Appendix B. The sample period is 2003-2012 and consists of 12,284 observations for all models. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

		Idiosyncratic Volatility ($\ln[\sigma_e^2]$)				**Asynchronicity (Φ)**			
		EQ = DDSTD measure		EQ = KZABS measure		EQ = DDSTD measure		EQ = KZABS measure	
Variable	Expected Sign	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)
$InnateEQ_{i,t-1}$	(+)	10.574*** (4.33)		16.676*** (6.30)		7.653*** (3.72)		6.956*** (3.07)	
$DiscEQ_{i,t-1}$	(+)	3.455*** (7.03)		1.314*** (5.15)		1.486*** (2.68)		0.840*** (3.08)	
$EQ_{i,t-1}$	(+)		3.458*** (6.11)		1.569*** (5.79)		0.785 (1.33)		0.973*** (3.49)
$RET^2_{i,t-1}$	(+)	0.023 (0.86)	0.021 (0.77)	0.029 (1.12)	0.020 (0.77)	0.215*** (9.38)	0.202*** (9.07)	0.220*** (9.22)	0.201*** (9.06)
$CFO_{i,t+1}$	(-)	0.162 (1.01)	0.239 (1.45)	0.151 (0.95)	0.237 (1.45)	-0.294* (-1.73)	-0.166 (-1.05)	-0.332* (-1.89)	-0.167 (-1.07)
$VCFO_{i,t-1}$	(+)	0.153 (0.95)	0.953*** (3.65)	-0.497 (-1.05)	1.264 (5.26)	1.416*** (4.19)	1.909*** (7.28)	1.463*** (3.85)	1.824*** (7.69)
$ROE_{i,t-1}$	(-)	0.061 (0.75)	0.057 (0.71)	0.122 (1.48)	0.072 (0.88)	-0.141** (-2.15)	-0.129* (-1.94)	-0.117* (-1.82)	-0.112* (-1.71)
$SIZE_{i,t-1}$	(-)	-0.189*** (-21.58)	-0.192*** (-25.89)	-0.182*** (-22.87)	-0.194*** (-26.40)	-0.240*** (-24.94)	-0.239*** (-28.13)	-0.243*** (-26.33)	-0.239*** (-28.33)

$LEV_{i,t-1}$	(+)	0.790*** (14.02)	0.794*** (15.92)	0.850*** (15.09)	0.797*** (15.93)	0.493*** (8.02)	0.386*** (7.11)	0.511*** (8.21)	0.388*** (7.09)
$BM_{i,t-1}$	(-)	0.031 (1.58)	0.029 (1.51)	0.023 (1.19)	0.025 (1.33)	-0.047*** (-2.68)	-0.054*** (-3.14)	-0.053*** (-2.93)	-0.055*** (-3.18)
$RET_{i,t}$	(-)	-0.145* (-1.96)	-0.147** (-2.02)	-0.138* (-1.86)	-0.146** (-2.01)	0.261*** (5.25)	0.252*** (5.24)	0.266*** (5.40)	0.253*** (5.28)
$LOSS_{i,t-1}$	(+)	0.192*** (6.00)	0.185*** (5.87)	0.163*** (6.51)	0.175*** (5.67)	0.119*** (3.28)	0.050 (1.64)	0.124*** (4.12)	0.046 (1.52)
$SKEW_{i,t}$	(+)	0.214*** (14.49)	0.213*** (15.00)	0.215*** (14.69)	0.213*** (14.93)	0.215*** (11.15)	0.208*** (11.16)	0.216*** (11.20)	0.208*** (11.15)
$KURT_{i,t}$	(+)	-0.000 (-0.04)	0.000 (0.15)	0.000 (0.10)	0.000 (0.16)	-0.002 (-0.95)	-0.002 (-0.87)	-0.002 (-0.88)	-0.002 (-0.86)
$VSALES_{i,t-1}$	(+)		0.530*** (3.30)		0.587*** (3.63)		0.278* (1.67)		0.278* (1.67)
$OPCYCLE_{i,t-1}$	(+)		0.119** (2.33)		0.119** (2.36)		0.090* (1.94)		0.089* (1.93)
$NEG_{i,t-1}$	(+)		0.121** (2.17)		0.169*** (3.02)		0.384*** (7.62)		0.395*** (7.90)
$INTAN_{i,t-1}$	(+)		-0.008 (-0.11)		0.001 (0.02)		0.090 (1.04)		0.089 (1.03)
$INTANDUM_{i,t-1}$	(+)		0.020 (0.45)		0.013 (0.30)		0.077* (1.69)		0.075 (1.65)
$CAPITAL_{i,t-1}$	(-)		-0.152 (-1.39)		-0.165 (-1.50)		-0.024 (-0.28)		-0.023 (-0.26)
$\ln[\beta^2]_{i,t}$	(+/-)	0.089*** (11.86)	0.085*** (11.72)	0.090*** (12.15)	0.087*** (11.98)	-0.756*** (-76.68)	-0.761*** (-77.39)	-0.755*** (-77.88)	-0.761*** (-77.49)
Intercept		2.871*** (21.66)	2.412*** (8.23)	2.637 (19.24)	2.447*** (8.41)	3.172*** (22.43)	2.778*** (9.81)	3.186*** (21.81)	2.779*** (9.84)
N		12,284	12,284	12,284	12,284	12,284	12,284	12,284	12,284
Adjusted R^2		43.51%	43.98%	43.99%	43.94%	87.67%	87.82%	87.66%	87.83%
F-stat (p value) H_0: $\alpha_1 = \alpha_2$ H_1: $\alpha_1 > \alpha_2$		8.24*** (0.000)		35.88*** (0.000)		8.37*** (0.000)		7.53*** (0.000)	

Francis et al. (2005) suggest another method (Method 2) in which innate factors affecting earnings quality are included in the original volatility regression as additional explanatory variables. According to Method 2, the model appears like the following[23]:

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \alpha_{13} VSALES_{i,t-1} + \alpha_{14} OPCYCLE_{i,t-1} + \alpha_{15} NEG_{i,t-1} + \alpha_{16} INTAN_{i,t-1} + \alpha_{17} INTANDUM_{i,t-1} + \alpha_{18} CAPITAL_{i,t-1} + \alpha_{19} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.10)}$$

One difficulty with Method 2 is that it does not provide a distinct estimate of two components of earnings quality. Rather, in this extended regression, the coefficient on EQ (DDSTD and KZABS) captures the effect of discretionary component on firm-specific return volatility in addition to the effect captured by the innate factors.

Column Method 2 of Table 5.5 reports the result of estimating Eq. (5.10) when idiosyncratic volatility is the dependent variable. I continue to find positive and significant coefficient on EQ for both measures even after controlling for the innate factors. Placing these results with respect to those for total earnings quality (reported in Table 5.4), I find that the effect of discretionary earnings quality is less than the effect of total earnings quality which reflects both innate and discretionary effects. This finding is indicative of weaker effect of discretionary component relative to innate component of earnings quality. I re-estimate Eq. (5.10) using asynchronicity as the dependent variable. The results presented in Table 5.5 indicate that the coefficient on EQ for DDSTD measure is positive but not significant while the coefficient on EQ for KZABS measure is significantly positive. Both the coefficients are smaller in magnitude compared to their counterparts in Table 5.4. Thus, Method 2 provides indirect evidence that innate component of earnings quality has larger impact on firm-specific return volatility than discretionary component.

5.5.4 Sensitivity Tests

I examine the sensitivity of the results using alternative asset pricing model to estimate the proxies for firm-specific return volatility. My primary results are based on idiosyncratic volatility and asynchronicity calculated from market model (CAPM) residuals and R^2. An

[23] Since firm size and cash flows volatility are already included in the original regression as determinants of firm-specific return volatility, I do not include the innate factor ASSET which also captures size, in equation (5.10) to avoid duplication of the same construct, and include cash flows volatility once.

alternative asset pricing model is Fama-French (1993) three-factor model. Specifically, I estimate annual firm-specific regression of daily excess return on daily market excess return, SMB factor return and HML factor return and use the residuals and R^2 to calculate idiosyncratic volatility and asynchronicity. I collect data on daily risk-free rate, daily stock return and market return, SMB factor return and HML factor return from Nikkei Portfolio Master (NPM) database. Table 5.6 reports coefficients and t-statistics from regression of Fama-French (1993) three-factor model based idiosyncratic volatility and asynchronicity on earnings quality and other control variables before and after controlling for beta. I include all control variables identified in section 5.3.3 but do not report their coefficients for the sake of brevity. The result shows that when idiosyncratic volatility is used as dependent variable, the coefficient on earnings quality is positive and significant before and after controlling of beta. But when asynchronicity is used as dependent variable, the coefficient on earnings quality is negative before controlling beta and changes to positive (the coefficient on EQ for DDSTD measure is not significant) after controlling beta for both measures of earnings quality. This result reinforces that controlling for beta is important for asynchronicity because beta, as one of the components of asynchronicity, is strongly related with earnings quality which forces the coefficient on earnings quality to be negative. Table 5.7 reports coefficients and t-statistics from regression of Fama-French (1993) three-factor model based idiosyncratic volatility and asynchronicity on two distinct components of earnings quality and other control variables including beta under two methods of separating innate and discretionary component of earnings quality. I only report coefficients of variable of interest for succinctness. The results show that under Method 1, which yields distinct estimate of two components, innate earnings quality has significantly larger impact on return volatility than discretionary component for different measures of firm-specific return volatility and earnings quality. Under Method 2, the coefficient on earnings quality capturing discretionary effect is positive and smaller than the coefficient on total earnings quality (reported in Table 5.6). The results reported in Table 5.6 and 5.7 are qualitatively similar to those reported in Table 5.3, 5.4 and 5.5 except for asynchronicity when DDSTD is a measure of earnings quality. Therefore, I conclude that the results from traditional CAPM consistent asset pricing model are not sensitive to the alternative firm-specific return volatility measures estimated from Fama-French (1993) three-factor model.

Table 5.6: Regression of Fama-French 3-Factor Model Based Idiosyncratic Volatility and Asynchronicity on Earnings Quality and Other Control Variables before and after Controlling for Beta

This table reports estimation of Eq. (5.4) and Eq. (5.7)

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.4)}$$

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \alpha_{13} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.7)}$$

where VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) calculated from Fama-French 3-factor model. EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of modified Jones (1991) model. All other variables are defined in Appendix B. The sample period is 2003-2012 and consists of 12,284 observations for all models. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively. For the sake of brevity, I report only the coefficients of variable of interest.

		Idiosyncratic Volatility ($\ln[\sigma_e^2]$)				**Asynchronicity (Φ)**			
		EQ = DDSTD measure		EQ = KZABS measure		EQ = DDSTD measure		EQ = KZABS measure	
Variable	Expected Sign	Before controlling beta Eq. (5.4)	After controlling beta Eq. (5.7)	Before controlling beta Eq. (5.4)	After controlling beta Eq. (5.7)	Before controlling beta Eq. (5.4)	After controlling beta Eq. (5.7)	Before controlling beta Eq. (5.4)	After controlling beta Eq. (5.7)
$EQ_{i,t-1}$	(+)	6.135*** (8.92)	4.551*** (6.92)	2.105*** (6.48)	1.835*** (6.00)	-9.223*** (-7.64)	0.878 (1.37)	-0.444 (-0.78)	1.225*** (4.42)
Other Control Variables		Included	Included	Included	Included	Included	Included	Included	Included
N		12,284	12,284	12,284	12,284	12,284	12,284	12,284	12,284
Adjusted R^2		39.77%	43.16%	39.36%	42.99%	36.96%	80.22%	36.46%	80.24%

Table 5.7: Regression of Fama-French 3-Factor Model Based Idiosyncratic Volatility and Asynchronicity on Innate and Discretionary Components of Earnings Quality after Controlling for Beta

This table reports estimation of Eq. (5.9) and Eq. (5.10)

$$VOL_{i,t} = \alpha_0 + \alpha_1 InnateEQ_{i,t-1} + \alpha_2 DiscEQ_{i,t-1} + \alpha_3 RET^2_{i,t-1} + \alpha_4 CFO_{i,t+1} + \alpha_5 VCFO_{i,t-1} + \alpha_6 ROE_{i,t-1} + \alpha_7 SIZE_{i,t-1} + \alpha_8 LEV_{i,t-1} + \alpha_9 BM_{i,t-1} + \alpha_{10} RET_{i,t} + \alpha_{11} LOSS_{i,t-1} + \alpha_{12} SKEW_{i,t} + \alpha_{13} KURT_{i,t} + \alpha_{14} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.9)}$$

$$VOL_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 RET^2_{i,t-1} + \alpha_3 CFO_{i,t+1} + \alpha_4 VCFO_{i,t-1} + \alpha_5 ROE_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 BM_{i,t-1} + \alpha_9 RET_{i,t} + \alpha_{10} LOSS_{i,t-1} + \alpha_{11} SKEW_{i,t} + \alpha_{12} KURT_{i,t} + \alpha_{13} VSALES_{i,t-1} + \alpha_{14} OPCYCLE_{i,t-1} + \alpha_{15} NEG_{i,t-1} + \alpha_{16} INTAN_{i,t-1} + \alpha_{17} INTANDUM_{i,t-1} + \alpha_{18} CAPITAL_{i,t-1} + \alpha_{19} \ln[\beta^2]_{i,t} + \zeta_{i,t} \quad \text{Eq. (5.10)}$$

where VOL represents idiosyncratic volatility ($\ln[\sigma_e^2]$) and asynchronicity (Φ) calculated from Fama-French 3-factor model. InnateEQ is the fitted value from Eq. (5.8) and DiscEQ is the residual from Eq. (5.8).

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \quad \text{Eq. (5.8)}$$

where EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of modified Jones (1991) model. InnateEQ and DiscEQ are inverse measure of innate and discretionary earnings quality respectively. All other variables are defined in Appendix B. The sample period is 2003-2012 and consists of 12,284 observations for all models. All variables are winsorized at the bottom and top 1% levels. *t*-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively. For the sake of brevity, I report only the coefficients of variable of interest.

		Idiosyncratic Volatility ($\ln[\sigma_e^2]$)				**Asynchronicity (Φ)**			
		EQ = DDSTD measure		EQ = KZABS measure		EQ = DDSTD measure		EQ = KZABS measure	
Variable	Expected Sign	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)	Method 1 Eq. (5.9)	Method 2 Eq. (5.10)
$InnateEQ_{i,t-1}$	(+)	12.530*** (6.96)		15.996*** (9.72)		6.769*** (4.13)		8.228*** (5.01)	
$DiscEQ_{i,t-1}$	(+)	3.609*** (6.90)		1.219*** (4.80)		1.545*** (2.87)		1.207*** (5.41)	
$EQ_{i,t-1}$	(+)		3.406*** (5.70)		1.595*** (5.65)		0.174 (0.28)		1.176*** (4.64)
Other Control Variables		Included	Included	Included	Included	Included	Included	Included	Included
N		12,284	12,284	12,284	12,284	12,284	12,284	12,284	12,284
Adjusted R^2		43.29%	43.74%	43.85%	43.71%	80.16%	80.28%	80.24%	80.30%
F-stat (p value) H_0: $\alpha_1 = \alpha_2$ H_1: $\alpha_1 > \alpha_2$		20.69*** (0.000)		83.03*** (0.000)		8.47*** (0.004)		18.15*** (0.000)	

5.6 Conclusion

This study investigates the cross-sectional relation between firm-specific return volatility and earnings quality of Japanese manufacturing firms for the period 2003-2012. Firm-specific return volatility has important implications for individual investors who cannot hold a well-diversified portfolio due to wealth constraint or by choice and arbitrageurs who require substitutes for mispriced stock with lower idiosyncratic risk. There is a controversy in the literature over whether firm-specific return volatility captures firm-specific information or noise in stock returns. The proponents of information hypothesis argue that greater firm-specific return volatility implies more firm-specific information being impounded in stock prices whereas the advocates of noise hypothesis claim that greater firm-specific return volatility is associated with noisier stock prices. Using idiosyncratic volatility and asynchronicity as proxies for firm-specific return volatility, I document that firm-specific return volatility is systematically associated with circumstances in which stock prices are unlikely to be informative, including settings characterized by the presence of greater information asymmetry, higher illiquidity and liquidity risk, lower institutional shareholdings and more zero return day, consistent with noise based explanation. However, in an examination of the association between earnings quality and firm-specific return volatility using multivariate regression analysis, I find contradictory results. When I use idiosyncratic volatility as dependent variable, I find significant negative association between idiosyncratic volatility and earnings quality implying that idiosyncratic volatility decreases with high earnings quality. This finding is consistent with firm-specific return volatility proxied by idiosyncratic volatility captures noise. When I use asynchronicity as dependent variable, I find significant positive association between asynchronicity and earnings quality implying that asynchronicity increases with high earnings quality. This is consistent with firm-specific return volatility proxied by asynchronicity captures firm-specific information. Li et al. (2014) contend that the positive association between asynchronicity and earnings quality can arise from an association between earnings quality and one of the three components of asynchronicity: idiosyncratic volatility, beta, and market return volatility. Following the suggestion of Li et al. (2014), I show that the contradiction arises because earnings quality is related to both the beta and idiosyncratic risk components of asynchronicity, with a stronger relation for beta. When I control for beta in the empirical specification, the contradiction is resolved and I find significant negative association between firm-specific return volatility and

earnings quality. I interpret my evidence as consistent with noise based explanation of firm-specific return volatility as opposed to information based explanation.

Then, I provide new evidence on the relationship between firm-specific return volatility and two distinct components of earnings quality. Both innate and discretionary components of earnings quality are significantly associated with firm-specific return volatility with innate component having larger effect than discretionary component. This finding indicates that firm-specific return volatility is likely to be higher for firms operating in an uncertain environment and for firms whose managers use their discretion over accruals opportunistically. The significantly larger effect of innate component is consistent with the conjecture that in a broad cross-section of firms, discretionary component may contain performance subcomponent, opportunistic subcomponent or noise confounding the net effect. My findings are insensitive to the firm-specific return volatility measures estimated from alternative Fama-French (1993) three-factor asset pricing model. Overall, the results are consistent with the existence of a significant cross-sectional association between firm-specific return volatility and two accruals-based proxies of earnings quality and their components.

Chapter Six
Earnings Quality and Information Asymmetry

6.1 Introduction

Information asymmetry is a fundamental concept in accounting literature because it drives the demand for financial disclosure. Information asymmetry exists when investors do not have equal access to the information, or they are differentially informed about a firm's value. When one or more investors have private information about the firms' value but other uninformed investors only have access to public information, investors with private information are likely to trade profitably at the expense of other uninformed investors. A large number of existing analytical and empirical research addresses the issue of whether information asymmetry affects the cost of capital. Analytical models (Kyle, 1985; Glosten and Milgrom, 1985) predict that the presence of information asymmetry creates an adverse selection risk for the liquidity providers in the market when privately informed investors trade on the basis of their private information. In response, liquidity traders demand a larger compensation and widen the spread between the bid and the ask prices resulting in constrained liquidity and increased cost of capital. Easely and O'Hara (2004) propose a model in which informed investors exploit their access to private information in a trade with uninformed investors and hold portfolios heavily weighted to stocks with good news and against stocks with bad news. This uneven distribution of information between informed and uninformed investors increases the risk to the uninformed investors, who cannot adjust their portfolios to account for private information. In equilibrium, information asymmetry is priced to reflect this information risk faced by uninformed investors. Recent analytical studies provide new insight on when information asymmetry affects the cost of capital (Lambert et al., 2011; Lambert and Verrecchia, 2010). In a perfectly competitive equity market, information asymmetry has no effect on the cost of capital. However, when the market is not characterized by perfect competition, information asymmetry can have a separate effect on the cost of capital. Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996), Easley et al. (2002), Armstrong et al. (2011) and Akins et al. (2012) provide empirical evidence consistent with the prediction of theoretical studies. Amihud and Mendelson (1986) find that raw bid-ask spreads are positively related to expected returns. Using two measures of the variable and fixed costs of transacting, one of which includes the adverse selection component, Brennan and

Subrahmanyam (1996) find a significant return premium, controlling for the Fama-French three-factor model, associated with the variable and fixed trading cost components. Easley et al. (2002) document an association between information asymmetry proxied by the probability of informed trade (PIN) and measures of expected returns. Both Armstrong et al. (2011) and Akins et al. (2012) examine the impact of investor competition over information on pricing of information asymmetry and find that information asymmetry affects the cost of capital, but the pricing of information asymmetry decreases when there is more competition among investors over information. These studies suggest that information asymmetry is important to the firms because it is positively related to the cost of equity capital especially when the competition in the equity market is imperfect.

Another body of literature examines the determinants of information asymmetry and finds that level of disclosure or disclosure quality is an important factor affecting information asymmetry. The key argument of this body of literature holds that if the ability of investors to process earnings-related information differs, then poor earnings quality can lead to differentially informed investors and thereby, aggravate the information asymmetry in the financial markets (Diamond and Verrecchia, 1991; Kim and Verrecchia, 1994; Bhattacharya et al., 2013). Economic theory (Diamond, 1985; Verrecchia, 2001) suggests that disclosure reduces information asymmetry through two channels: disclosure directly reduces the amount of private information compared to publicly available information, and it indirectly minimizes private information search incentives. Empirical evidence in Brown and Hillegeist (2007) provide support to this argument. Regulators and standard setters view the reduction in information asymmetry to be an important benefit of improved earnings quality (Levitt, 1998; FASB, 2001). They argue that more and better disclosure by firms leads to less information asymmetry among investors and ‘‘levels the playing field’’ so that the capital markets become more attractive to “ordinary” uninformed investors. All these studies suggest an association between earnings quality and information asymmetry. While many studies in U.S. setting confirm the existence of this association, the literature on this dimension in the Japanese context is limited. Ajward and Takehara (2011) is one study that investigates the relationship between earnings quality and information asymmetry but report mixed results. Moreover, Verrecchia and Wang (2011) suggest that the channel and level of communication of information between managers and shareholders of “Keiretsu” firms facilitate free flow of information between firm and its major

shareholders. Because of direct and private access to "insider information" by the major shareholders, the level of information asymmetry between different types of investors may be more pervasive in Japan. This unique institutional feature of Japanese firms presents an appealing setting to address issues relating to the determinants of information asymmetry. Given the scant empirical literature examining the association between earnings quality and information asymmetry in the Japanese context and the incongruent results reported by the sole study, this chapter presents a study that will explore the impact of providing high-quality earnings information to the investors on reducing information asymmetry among investors. In addition, I assess the differential impact of innate and discretionary components of earnings quality on information asymmetry.

6.2 Literature Review and Hypotheses Development

This section reviews prior theoretical and empirical literature on whether or how disclosure or earnings quality affects information asymmetry among investors and develops two testable hypotheses to be examined in this chapter.

6.2.1 Review of Prior Theoretical and Empirical Literature

Theoretical papers explore several mechanisms through which disclosure quality affects information asymmetry. One such mechanism is to alter the trading behavior of uninformed traders by providing high-quality disclosures. Merton's (1987) incomplete information model shows that investors are unaware of certain assets in the market and as a result, uninformed investors are more likely to invest and trade in firms that are well known in the market or that they judge favorably. For the less familiar firms, a higher level of disclosure will make them more visible to the uninformed investors and persuade uninformed investors to trade more in those firms' stock. Thus, increased disclosures affect information asymmetry by altering the trading pattern of uninformed investors. Fishman and Hagerty (1989) describe a model in which more informative disclosures reduce the costs associated with processing and assimilating public information about the firm, resulting in more non-privately informed investors. As a result, greater disclosure induces more investing by uninformed liquidity traders. One possible explanation is that uninformed investors feel more confident while investing their funds in the firms that constantly disclose high-quality information, which reduces, ceteris paribus, the risk of

trading against a privately informed investor. Diamond and Verrecchia (1991) find that under certain conditions, the amount of trading by large uninformed investors increases as the firm releases more information. While a higher intensity of publicly informed trading reduces the possibility of trading against a privately informed investor, prior research indicates that greater uninformed trading may attract more informed trading. Kyle (1985) demonstrates that increases in uninformed trading trigger more informed trading. When investors are risk neutral and are not constrained by capital, the amount of informed trading changes proportionately with the expected amount of uninformed trading. Thus, the relative amount of informed trading remains unchanged when the anticipated amount of uninformed trading changes. However, if the informed traders are risk averse and are constrained by capital requirement, then higher disclosure quality will lead to relatively less amount of informed trading, which in turn will reduce information asymmetry.

Disclosure quality can also affect information asymmetry by lowering the amount of private information available and/or by altering the incentives to search for private information. Verrecchia (1982) examines a setting where public information disclosed by the firm is a perfect substitute for private information and shows that increasing the publicly available information decreases the amount of costly private information that investors acquire on their own. Diamond (1985) also finds that disclosure of more public information reduces the incentives for investors to acquire private information. Both studies demonstrate that releasing public information not only reduces the incentives for the production of private information by the traders but also improves risk sharing among investors by making their beliefs more homogenous.

Overall, theoretical studies suggest that public disclosure quality can lessen the level of information asymmetry by reducing the intensity of private information based trading relative to the amount of uninformed trading or by decreasing the frequency with which informed investors discover and trade on private information, or by reducing both informed trading and private information search incentives.

Prior empirical literature also suggests that earnings quality will be negatively related to information asymmetry. Welker (1995) is the first empirical study that reveals a significant negative relation between disclosure policy and information asymmetry measured using bid-ask spreads, even after controlling for the effects of return volatility, trading volume, and share price. The findings of this study suggest that a well-regarded disclosure policy reduces information

asymmetry and hence increases market liquidity. Healy et al. (1999) examine firms that achieved continuous improvements in disclosure quality (using AIMR scores) and document that these firms exhibit improvements in a number of variables, including improved liquidity measured by the bid-ask spread. Leuz and Verrecchia (2000) document that firms that commit to either IAS or U.S. GAAP enjoy lower bid-ask spreads and higher share turnover than firms using German GAAP. They also investigate the bid-ask spreads and trading volume around the switch to international reporting standards and find similar results. Heflin et al. (2005) examine the relation between disclosure policy ratings and market liquidity employing bid-ask spreads and quoted depth. They find that effective spreads are negatively related to disclosure policy ratings. They also investigate the relation between disclosure policy ratings and quoted depths and find that firms with higher rated disclosures have lower quoted depths. With respect to disclosure ratings, their results do not support the simple intuitive notion that quoted depth "mirrors" bid-ask spreads. Since a simple examination of effective spreads and quoted depths yields ambiguous inferences about the relation between disclosure policy and market liquidity, they condition their analyses of disclosure policy ratings and effective spreads on order size and find an inverse relation between depth-adjusted effective spreads and disclosure ratings for all order sizes. Thus, traders in shares of firms with higher rated disclosures pay lower trading costs, even on large orders, despite these firms' lower quoted depths. Brown and Hillegeist (2007) document a negative relation between disclosure quality measured by AIMR scores and the probability of informed trade (PIN) measure. They also investigate the underlying reason of the relationship and indicate that disclosure quality primarily affects information asymmetry by reducing the likelihood that investors discover and trade on private information. Using an accruals-based measure of earnings quality (Dechow-Dichev accrual quality) and a market microstructure based measure of information asymmetry (adverse selection component of bid-ask spread), Bhattacharya et al. (2013) find that poor earnings quality is significantly and incrementally associated with higher information asymmetry. They also examine the impact of two key determinants of earnings quality (innate factors and discretionary factors) and document that the innate component has a significant incremental impact on information asymmetry.

The studies mentioned above focus on the relation between disclosure ratings or earnings quality and information asymmetry or market liquidity. A small number of studies also examine the linkage between various earnings attributes and the liquidity cost in financial markets.

Affleck-Graves et al. (2002) find that firms with higher dispersion in analysts' forecasts (a measure of less predictable earnings) experience higher bid-ask spreads although forecast dispersion is not a direct measure of financial reporting quality. In another study, Jayaraman (2008) documents an association between accruals volatility and bid-ask spreads and PIN. Accrual is a key component of earnings, and thus, the quality of earnings is dependent on the volatility of accruals driven by managerial discretion. These studies suggest that managers can lessen the level of information asymmetry among investors by proving better quality earnings information.

The frequency of private information events and investors' eagerness to search and trade on private information exacerbate information asymmetry. Some empirical literature suggests that voluntary disclosure of information and disclosure quality will be negatively related to the frequency of private information events, thereby narrowing the gap between informed and uninformed investors (Brown and Hillegeist, 2007). Gelb and Zarowin (2002) and Lundholm and Myers (2002) find that current stock returns are more informative about future earnings when disclosure quality is higher, implying that by revealing more information about future earnings that can be privately acquired, high-quality disclosures reduce the total amount of information available about a firm. Since there is less information available to be discovered, the frequency of private information events will be declining in disclosure quality. Coller and Yohn (1997) investigate whether the decision to voluntary issue a management earnings forecast is related to information asymmetry in the market for the firm's stock and whether the forecasts reduce the information asymmetry. Although they find no significant differences in spreads between forecasters and non-forecasters during the nine days after the release of the management forecast, they report that spreads in the nine days after the forecast are significantly smaller than spreads in the nine days prior to the forecast for forecasting firms. This finding is consistent with the idea that issuance of management earnings forecast reduces investors' incentive to search for private information about the forthcoming announcement, which in turn, reduces information asymmetry. Eleswarapu et al. (2004) study the impact of regulation fair disclosure on information asymmetry. Regulation Fair Disclosure (Regulation FD) prohibits selective disclosure of material information to analysts and other investment professionals. The regulation was intended to ensure equal access to firm disclosures. The authors hypothesize that if equal access is improved, then the amount of asymmetric information would decline subsequent to regulatory adoption and

find that the adverse selection component of trading costs declines after the adoption of Regulation FD. These studies indicate that if high-quality earnings can reduce private information events or private information search incentives, information asymmetry is likely to improve. On the other hand, Brown et al. (2004) provide evidence on how voluntary disclosures, as measured by conference calls, change the trading pattern of informed and uninformed investors and reduce information asymmetry by lowering private information relative to publicly available information. Firms arrange conference calls for broadening the real-time access to information by the investors which is likely to narrow the information gap. Their cross-sectional tests indicate a highly significant and negative association between conference call frequency and the subsequent level of information asymmetry after controlling for potentially confounding factors. The underlying reason of this negative relation is that more conference calls reduce the relative amount of informed trading, and this effect more than overcomes the associated increase in the frequency of information events.

Several studies investigate the effect of more informative accounting methods on information asymmetry. For example, critics of immediate expensing of R&D assert that this method creates ambiguity among investors about the value of R&D, thus increasing the information gap between management and investors. Consistent with this logic, many studies demonstrate that R&D-intensive firms have higher information asymmetry and propose that capitalizing R&D will reduce information asymmetry (Aboody and Lev, 2000; Boone and Raman, 2001). In a similar line, Mohd (2005) investigates the impact of capitalization of software development costs on information asymmetry. He argues that when firms capitalize R&D, they convey information to the market about the success of these activities, which in turn affects investors' beliefs about R&D future payoffs, resulting in a reduction in information asymmetry. Consistent with his prediction, he finds that information asymmetry is low for software firms related to other high-tech firms and within software firms, capitalizers have lower information asymmetry than expensers. Bartov and Bodnar (1996) proposes an information asymmetry perspective which implies that managers maximizing firm value will choose accounting techniques, from the set, available, that reduce information asymmetry to the point where the expected benefit of additional disclosure is offset by the expected costs of making the disclosure. Their empirical findings support the predictions of the information asymmetry perspective. Specifically, measures of information asymmetry are positively related to the

likelihood of choosing the foreign currency as functional currency by the sample firms. Thus, the results are consistent with the prediction that firms with high information asymmetry attempt to reduce it through the adoption of more informative accounting procedures. The findings of these studies imply that accounting methods that provide more informative information to the investors reduce information asymmetry.

While most of the studies on the relation between disclosure quality and information asymmetry are conducted in the USA or international context, a survey of literature of contemporary research on this dimension in the Japanese context is seen as limited and inconclusive. Otogawa (2003) investigates the information asymmetry and liquidity around quarterly earnings announcements, measured by the percentage bid-ask spreads and quoted depths. The study finds that daily bid-ask spreads decrease significantly, and daily depths increase slightly during the period just after the quarterly earnings are announced. However, the study does not find strong evidence that the spreads are wider, and the depths are lower during the pre-announcement and announcement periods. The results suggest that more frequent public disclosure of information has a positive effect on the level of information asymmetry. Ebihara et al. (2014) compare liquidity and information asymmetry between family firms and non-family firms in Japan and find that family firms have lower market liquidity and higher information asymmetry. They suggest that more voluntary disclosure of information by family firms is required to increase market liquidity of traded stocks or to reduce the probability of private information based trades. Neither of these studies directly tests the association between earnings quality and information asymmetry. One study that investigates the relation between earnings quality and information asymmetry using Japanese data is Ajward and Takehara (2011) who report contradictory results employing two different proxies for earnings quality. They find a negative but insignificant relation (without controlling for alternative portfolio style) between absolute abnormal accruals (Kasznik) and the degree of information asymmetry but an unexpected positive and significant relation between accruals quality (Dechow-Dichev) and the degree of information asymmetry. The results, as a whole, are not very much compelling and also contrary to the hypothesis. The mixed findings reported in the Japanese context have kept the issue open for further investigation using alternative proxies for relevant variables or employing different methodologies. I exploit this opportunity to advance the literature of stock

market consequences of high-quality earnings by examining the impact of earnings quality on the level of information asymmetry among investors.

6.2.2 Development of Testable Hypotheses

6.2.2.1 Earnings Quality and Information Asymmetry

Several theoretical studies feature formal models of how earnings-related information might affect information asymmetry. Verrecchia (1982) was one of the first such studies. He concludes that increasing public information decreases the amount of costly private information search. Assuming public information as a substitute for private information, his model suggests that fewer traders will pay for costly private information when public information is available. In his model, the existence of earnings information leads to less information asymmetry in the stock market. Diamond (1985) also shows that the release of public information reduces the incentives for investors to acquire private information. He concludes that public information makes traders belief more homogeneous and reduces informed traders' speculative positions. Some research has modeled how the anticipation and release of earnings news affect information asymmetry in the days immediately around the announcement. McNicholes and Trueman (1994) and Demski and Feltham (1994) show that the anticipation of earnings announcements may increase information asymmetry prior to the announcement. Kim and Verrecchia (1994) model information asymmetry on the day earnings are announced. Their model predicts an increase in information asymmetry immediately after the release of the earnings news. Empirical researchers have also examined how earnings announcement and other information events affect information asymmetry in the market. For example, Otogawa (2003) finds evidence of a significant decrease in daily bid-ask spreads and slight increase in daily depths during the period just after the release of quarterly earnings but doesn't find any strong evidence that the spreads are wider and depths are lower during the pre-announcement and announcement period for a sample of firms listed in Tokyo Stock Exchange. It should be noted that all these studies are devoted to examining how disclosure of public information may reduce information asymmetry in the stock market or how information asymmetry may change in the days surrounding an information event. The focal point of these research studies, however, relates to general public disclosure of information or financial analysts' rating of the overall level of disclosure rather than concentrating on specific

measures of the quality of such disclosure.[24] Bhattacharya et al. (2013) is a recent study that examines directly the association between earnings quality and information asymmetry during non-earnings announcement period. Drawing on the arguments provided by Kim and Verrecchia (1994) and empirical evidence in Sloan (1996) that the marginal investors fail to incorporate fully the mean-reverting property of the accruals of firms with large accruals, Bhattacharya et al. (2013) infer inverse relation between accrual-based earnings quality and information asymmetry. They argue that if investors have different ability to process earnings-related information, some investors who are capable of generating a precise signal from noisy public disclosure because of their superior information processing ability gain information advantage compared to their less sophisticated counterparts. Thus, poor earnings quality can result in differentially informed investors and contribute to worsening information asymmetry among market participants. Accordingly, I expect that the level of information asymmetry will be higher for firms with poor earnings quality. I formalize my expectation in the form of following alternative hypothesis:

H5: Earnings quality is negatively associated with information asymmetry

6.2.2.2 Innate versus Discretionary Component of Earnings Quality and Information Asymmetry

Many earnings quality researchers who employed accruals-based measures of earnings quality explicitly or implicitly assume that earnings quality is mainly determined by managerial discretionary choices. One implication of this assumption is that managers have absolute control over earnings quality. However, recent research, starting from Francis et al. (2004, 2005), has recognized that earnings quality is not only driven by managers' reporting choices and judgment but also affected by operational uncertainty and business model. Drawing on this idea, Francis et al. (2005) disentangle earnings quality effects stemming from the firm fundamentals (innate earnings quality) from earnings quality effects due to managerial incentives (discretionary earnings quality). This distinction is important because managers may not have adequate control over the firm fundamentals and the economic environment in which the firms operate, at least in

[24] Lev (1989) is the first research paper that discusses about the notion of earnings quality and its consequences. According to Lev (1989), when a firm's financial information disclosure is more "equitable" and "broadly informative", the information asymmetry between informed and uninformed traders is lower. Therefore, a more equitable disclosure policy would result in lower bid-ask spreads. Other things being equal, information asymmetry increases as the amount or quality of public information decreases. Therefore, firms with high quality public information should have lower bid-ask spreads. Greenstein and Sami (1994) imply that by improving the quality and content of accounting information, accountants may be able to help improve the transactional efficiency of stock markets.

the short run.[25] Despite the absence of any theoretical study that distinguishes between innate and discretionary component of earnings quality and predicts the effect of each component on information asymmetry, Bhattacharya et al. (2013) empirically investigates the contribution of innate and discretionary earnings quality to information asymmetry. They find that both innate and discretionary components of earnings quality have a negative and significant impact on information asymmetry consistent with their ex-ante expectation of an inverse and linear relationship. On the contrary, the non-linear specification suggests that the form of relationship is different for discretionary component. In particular, they find a U-shaped relation between discretionary earnings quality and information asymmetry wherein large discretionary accruals (both positive and negative) are associated with higher information asymmetry. However, they do not investigate the differential impact of innate and discretionary component of earnings quality on information asymmetry.

Although theoretical models do not predict any difference between the effect of innate and discretionary earnings quality, research on accounting choice and earnings management suggests a potential distinction between the effects of the innate and discretionary components of earnings quality. Prior literature on the intent of managerial discretionary behavior offers competing views (Holthausen, 1990). According to these views, discretionary accounting choices are made to communicate managers' private information or to conceal the true underlying economic performance of the firm in an attempt to enhance managers' welfare at the expense of investors or to minimize contracting costs amongst the various contracting parties to the firm which, in turn, maximizes firm value. In a similar note, Guay et al. (1996) recognize that the discretionary component of earnings quality combines three separate effects. The first one is performance effect which captures management's attempts to transmit relevant and reliable information about firm performance. The performance effect is expected to improve earnings quality. In contrast, the second effect reflects managerial opportunism and the third effect represents pure noise, both of which are expected to reduce earnings quality. In a broad cross-section of firms covering long time periods, there will be observations where managerial

[25] Innate earnings quality can also be related with discretionary earnings quality because the underlying assumption that managerial discretion is not related to firm fundamentals may be incorrect. The innate features of the firms' economic environment may create earnings management incentives or provide the flexibility required to engage in earnings management activities. For example, firms with longer operating cycle have more flexibility in using working capital accruals to manage earnings.

discretion is used to reap opportunistic gains as well as to signal private information making empirical identification of the managers' intention difficult except in some specific settings where incentives play a key role. Recognizing this possibility, Francis et al. (2006) conclude that, the net earnings quality effect of management's implementation decisions could be positive, negative or neutral. If discretionary earnings quality reflects a combination of performance improvement and opportunism plus noise, its overall impact on information asymmetry is likely to be smaller than the impact of innate earnings quality. Therefore, I formulate following hypothesis asserted in alternative form on the basis of the prediction of differential effects between innate and discretionary component of earnings quality:

H6: The innate component of earnings quality has larger impact on information asymmetry than discretionary component of earnings quality

6.3 Variable Measurement

In this section, I explain measurement of the relative bid-ask spread, the proxy for information asymmetry, two proxies for earnings quality (accruals quality and absolute abnormal accruals) and other control variables known to be the determinants of information asymmetry. Appendix C summarizes the measurement of each of these variables.

6.3.1 Bid-Ask Spread

Information asymmetry is not directly observable, but recent advances in market microstructure studies suggest that bid-ask spread, an observable measure of market liquidity, can be used as a reasonable surrogate for information asymmetry facing uninformed traders in the equity market. The bid-ask spread is set by the specialists for a firm's stock. For example, in the New York Stock Exchange (NYSE), exchange-designated specialists offer simultaneous quotes to both buy and sell in order to fulfill their affirmative obligations to provide continuous liquidity to the market. Copeland and Galai (1983) and Glosten and Milgrom (1985) develop theoretical models that link information flows to bid-ask spread. These papers are based on the notion that a subset of traders has more information about the value of the stock than the specialists. These models suggest that specialists set the bid-ask spread so that the expected gains from uninformed traders cover the expected losses to informed traders. For example, Glosten and Milgrom (1985) posit that a market specialist charges higher ask price and lower bid price when

he anticipates that some investors are better informed or have private information. Therefore, the difference between the ask price and the bid price, commonly known as bid-ask spread, can be used to measure the extent of information asymmetry among market participants. This is one of the most frequently examined measures of information asymmetry since the difference between the quotes represents the round-trip cost of immediately reversing a trade position (Lehman and Modest, 1994).

For the purpose of this study, SPREAD is measured as the average of daily closing bid-ask spread for a firm in a fiscal year.[26] The average is taken over a period of twelve months starting from the fourth month after the beginning of a fiscal year in order to maintain consistency with the estimation period of earnings quality measure.[27] The daily spread is calculated as the difference between daily closing quoted ask price and closing quoted bid price, divided by the average of the ask and bid prices. This measure is also known as percentage spread or relative spread. I use the percentage or relative spread to facilitate cross-sectional comparability. I drop those days for which either ask price or bid price is missing from my calculation of spread measure. Finally, I require at least 150 days of non-zero ask and bid price for bid-ask spread calculation. I use natural log of spread measure in empirical analysis.[28]

The extant market microstructure literature demonstrates that the quoted bid-ask spread consists of three cost components incurred by the market-maker: inventory holding, order processing, and adverse selection costs. The inventory holding costs reflect the market maker's cost of not maintaining optimal levels of inventories while order processing costs represent the market maker's fixed costs such as clearing and settlement costs. The adverse selection cost of the spread is directly related to the perceived level of information asymmetry in the capital market as an uninformed market-maker will increase the spread to compensate for expected losses to privately informed traders (Glosten and Harris, 1988). In the absence of any exchange

[26] Prior research usually uses the closing bid-ask spread as a proxy for information asymmetry. One difficulty of using this measure is that adverse selection costs change at different time periods within a day. In TSE, the spread is U-shaped over the course of the trading day for firms in all size-decile categories (Lehman and Modest 1994). This U-shaped pattern is consistent with the inter-temporal variation in spread and is almost common in all market-microstructure studies. Although prior evidence suggests a temporal variation in spread, there is substantial cross-sectional variation in spread in all time periods within a day, which is sufficient to draw valid inference in a cross-sectional study.

[27] Since estimation of earning quality requires fiscal year-end data contained in annual reports which become publicly available to the market participants three months after the end of a fiscal year, I assume that investors are aware of earnings quality three months after the end of that fiscal year.

[28] Welker (1995) uses the natural log of relative spreads in empirical tests to control for heteroskedasticity.

designated specialists or market makers on the TSE, stock brokerage firms charge a commission for providing trading services, and order processing costs are not likely to be recovered by the bid-ask spreads. In addition, since all traders are able to post limit orders, no one should be forced to maintain an excess inventory position (Otogawa, 2003). Leuz and Verrecchia (2000) suggest that other spread components unrelated to information asymmetry are presumably less important in the order-driven market. As the TSE is an order driven market, I assume that quoted spread reasonably proxies for the adverse selection or information asymmetry component of the spread in the Japanese stock market.

6.3.2 Earnings Quality

I use two measures of earnings quality: Dechow and Dichev (2002) accrual quality (DDSTD) and Kasznik (1999) version of modified Jones (1991) absolute abnormal accruals (KZABS). These measures are described in greater detail below.

6.3.2.1 Accrual Quality (DDSTD) Measure Based on Dechow and Dichev (2002) Model

My first measure of earnings quality, DDSTD, is based on an approach proposed by Dechow and Dichev (2002) and implemented by Francis et al. (2005). The underlying premise of this approach is that earnings quality is primarily dependent on the quality of accruals because accounting earnings are the sum of operating cash flows and accruals. Operating cash flows are designated as hard measure and are more objectively determinable and verifiable than accruals. In contrast, accruals portion is subject to considerable managerial discretion and implementation decisions that make it extremely vulnerable to managerial incentives of earnings manipulation. One of the basic functions of accounting accruals is to anticipate future operating cash flows or to reflect current cash flows or reversals of past cash flows. As a result, any measurement error in estimating accruals could significantly impair the ability of accruals to assess future cash flows or to recognize the past and current cash flows. Such measurement error could be the result of either intentional errors arising from managerial incentives to manipulate earnings, or unintentional errors stemming from operational uncertainty and management lapses. The main idea behind Dechow and Dichev (2002) accruals quality model is to determine the magnitude of this measurement error resulting from poor mapping of current accruals into last-period, current-period and next-period cash flows from operation. The use of Dechow-Dichev accruals quality as

a measure of earnings quality suggests that earnings that map more precisely into cash flows are of better quality. Dechow and Dichev (2002) model the mapping of accruals into cash flows as follows:

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \nu_{i,t} \qquad \text{Eq. (6.1)}$$

where TCA is the total current accruals computed as ΔCA – ΔCL – ΔCash + ΔSTDEBT, ΔCA is the change in current assets, ΔCL is the change in current liabilities, ΔCash is the change in cash, ΔSTDEBT is the change in short-term debt included in current liabilities. CFO is the cash flows from operations calculated as NI-TCA+DEP, where NI is the net income, TCA is the total current accruals and DEP is the depreciation and amortization expense. Subscripts *i* and *t* are the firm and time subscripts, respectively.

McNichols (2002) suggests that the earnings quality measure derived from equation (6.1) can be improved by including two important determinants of accruals, that is, changes in revenues and the level of property, plant, and equipment. So, I augment equation (6.1) as follows (all variables excluding the intercept are scaled by average total assets):

$$TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \nu_{i,t} \qquad \text{Eq. (6.1a)}$$

where ΔREV is the change in revenues and PPE is the gross value of property, plant, and equipment. I estimate equation (6.1a) for every industry-year in each of 15 Nikkei two-digit industry groups in which I require at least 10 firms in each year.[29] The industry-specific cross-sectional regressions in a given year generate firm-specific residuals for that year.

Under equation (6.1a), higher accruals quality indicates that accruals can explain most of the variation in past, contemporaneous and future cash flows and, as a consequence, the firm-specific residuals, $\nu_{i,t}$, from equation (6.1a) form the basis of my first earnings quality proxy used in this study. Specifically, the earnings quality ($DDSTD_{i,t}$) is the standard deviation of firm *i*'s residuals, calculated over years *t-4* through *t*, i.e., $DDSTD_{i,t} = \sigma(\upsilon_{i,t-4,t})$. Larger standard deviation of residuals indicates poor accruals and earnings quality.

3.2.2 Absolute Abnormal Accruals (KZABS) Based on Kasznik (1999) Version of Modified Jones (1991) Model

Abnormal accrual is another widely used measure of earnings quality. The use of abnormal accrual as a measure of earnings quality rests on the view that accruals, which are not

[29] Consistent with Francis et al. (2005), I winsorize the extreme values of the distribution of the dependent and independent variables to the 1 and 99 percentiles.

well explained by accounting fundamentals, are an inverse measure of earnings quality. If a firm's total accruals deviate significantly from the normal level of accruals as determined by firm fundamentals, then such deviations are considered abnormal accruals. High level of abnormal accruals indicates manipulation of earnings by the management through opportunistic use of discretionary reporting choices. Thus, abnormal accruals distort the ability of earnings to reflect the real economic performance of the firms and are assumed to reduce the quality of accruals and earnings.

The abnormal accruals measure is typically estimated using some variants of the Jones (1991) approach. To determine abnormal accruals, I apply Kasznik version of modified Jones (1991) model and estimate the following regression for every industry-year in each of 15 Nikkei two-digit industry groups with at least 10 firms in each year (all variables excluding the intercept are scaled by average total assets)[30]:

$$TA_{i,t} = \delta_0 + \delta_1(\Delta REV_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 \Delta CFO_{i,t} + \eta_{i,t} \qquad \text{Eq. (6.2)}$$

where TA is the firm *i*'s total accruals, computed as TCA-DEP, TCA is the total current accruals, DEP is the depreciation and amortization expense, ΔREV is the change in revenues, ΔAR is the change in accounts receivable, PPE is the gross value of property, plant and equipment and ΔCFO is the change in cash flows from operation. Equation (6.2) is a modified and extended version of Jones (1991) model, which describes total accruals as a function of the changes in sales revenue and the level of property, plant, and equipment. Dechow et al. (1995) relax Jones's assumption that revenues are non-discretionary. Since discretion could be exercised over revenues by changing the timing of sales shipment, following the suggestion of Dechow et al. (1995), Kasznik adjusts the sales revenue variable for the change in accounts receivable. Kasznik also includes the change in operating cash flows as an explanatory variable based on Dechow's (1994) finding that cash flow from operation is significantly negatively correlated with total accruals. I prefer Kasznik version over modified Jones version because the former version considers significant correlation between cash flow from operation and total accruals in addition to two fundamental accounting variables used by the latter version. The explanatory power of Kasznik version is also higher than that of modified Jones version as reflected in higher R^2.

[30] Consistent with accrual quality measure, I also winsorize the extreme values of the distribution of the dependent and indepensdent variables to the 1 and 99 percentiles.

I treat the residual, $\eta_{i,t}$, from equation (6.2) as abnormal accruals and use the absolute value of abnormal accruals, i.e., $KZABS_{i,t} = |\eta_{i,t}|$ as my second proxy for earnings quality because firms with very large positive and negative abnormal accrual values are considered to have poor quality earnings. Consequently, I interpret higher (lower) values of KZABS as measures of lower (higher) earnings quality.

6.3.3 Control Variables

Based on a review of past literature, I expect several variables to be associated with the bid-ask spread. Previous theoretical studies suggest numerous determinants of bid-ask spread that should be controlled for in the empirical analysis and empirical studies identify significant associations of bid-ask spread with those determinants. The general findings are that relative spreads are negatively related to share price, trading volume and firm size, and positively related to stock return volatility and the adverse selection problem confronting specialists (Stoll, 2000; Welker, 1995). Building on extant literature, I control for the effects of share price, trading volume, return volatility, and firm size in the empirical specification of the relation between earnings quality and information asymmetry. In addition to these variables, I also include market-to-book ratio, leverage, institutional ownership and analysts following as additional control variables because these firm characteristics are found to be systematically associated with various measures of information asymmetry (Brown and Hillegeist, 2007; Bhattacharya et al., 2013). The detailed description and measurement of the control variables are discussed in this section along with their predicted relation with the bid-ask spread.

Stoll (1978) noted an inverse relation between relative spreads and stock prices, and suggested that stock price may serve as an inverse proxy for inventory holding risk, or stock price may capture the effect of order processing cost of the market-making activity.[31] In an empirical study, Lehman and Modest (1994) finds that stocks with higher prices tend to have lower percentage bid-ask spreads in TSE. I measure stock price (PRICE) as the average of daily closing stock price for a firm in a given year and use the logarithmic transformation of this

[31] Bhattacharya et al. (2013) also use stock price to control for the effect of higher risk associated with low priced stocks and the discreteness in the pricing grid. In all of their specifications, they find statistically significant negative coefficient on stock price.

variable.[32] I require at least 150 days price data to calculate this measure. I expect a negative relation between relative spread and share price.

Previous cross-sectional studies of the determinants of spread suggest that spread is positively related to specialists' inventory holding period, and trading volume serves as an inverse proxy for inventory holding period. On the other hand, some studies (e.g., Leuz and Verrecchia, 2000) use trading volume based measure such as share turnover as less explicit proxy for information asymmetry on the ground that trading volume captures investors' willingness to transact a firm's shares and this willingness to trade should be negatively related to the existence of information asymmetries. Leuz and Verreecchia (2000) find that commitment to increased level of disclosure reduces the possibility of information asymmetry as measured by share turnover. For this reason, Bhattacharya et al. (2013) use "orthogonalized volume" as a control variable. Trading volume (VOLUME) is measured as the average of daily share trading volume expressed in number of shares for a firm in a year.[33] I require at least 150 days volume data for a firm in any given year to calculate this measure, and this variable is also transformed into logarithmic form. Following Bhattacharya et al. (2013), I run an annual regression of trading volume on earnings quality measures and use the residuals as orthogonalized volume.[34] The residuals provide the component of trading volume unrelated to earnings quality measures. I expect a negative coefficient on trading volume.

I use the variance of daily stock return of a firm as the measure of stock return volatility (VOLATILITY).[35] I use natural log of volatility measure in empirical models. I include return volatility as an explanatory variable because prior studies suggest that return volatility captures the price risk the specialist faces on his/her inventory of the stocks (Welker, 1995) or the possibility that informed traders are more active in stocks with higher uncertainty (Bhattacharya et al., 2013). Based on the findings that poor earnings quality is associated with higher return

[32] Alternatively, I use fiscal year end closing price and find qualitatively similar results.

[33] All reported results are qualitatively similar if dollar trading volume instead of share trading volume is used. Dollar trading volume of a firm in a year is measured as the average of daily dollar trading volume whereas daily dollar trading volume is the number of shares traded in a day times closing share price on that day. I also use average of daily share turnover, defined as the number of shares traded divided by the number of shares outstanding, to control for the liquidity of the firm's share as an alternative to average daily trading volume. This alternative measure exhibits high correlations with my chosen proxy, and do not change the result.

[34] The results are not materially affected if I use unorthogonalized volume as a control variable.

[35] I also define stock return volatility as the standard deviation of daily market-adjusted return where market-adjusted return is calculated as the daily return of a firm minus return for the market index and find similar results. Use of idiosyncratic volatility as a proxy for stock return volatility produces qualitatively similar results.

volatility (Rajgopal and Venkatachalam, 2011), Bhattacharya et al. (2013) suggest researchers to be cautious while controlling for the effect of return volatility in examining the relation between earnings quality and a spread based measure of information asymmetry.[36] Following Bhattacharya et al. (2013), I include "orthogonalized volatility" as a control variable in all regression specifications. Specifically, I regress return volatility on earnings quality measures annually and consider the residuals that are independent of the earnings quality effects as orthogonalized volatility.[37] I expect a positive coefficient on stock return volatility.

Firms with long operating history and functioning in a richer information environment are expected to have low information asymmetry since information is easily and freely available to the investors about the current and future prospect of these firms. Lehman and Modest (1994) examine the liquidity characteristics of equities on the TSE and document that the bid-ask spread is a monotonic function of firm size with the highest spread recorded for the smallest firms and vice-versa. Firm size also proxies for the amount of prior information available about a firm and controls at least partially for the firm's information environment. I measure firm size (SIZE) as the natural logarithm of market capitalization at the end of the fiscal year. Market capitalization is calculated as the closing stock price times the number of stocks outstanding at the end of the fiscal year. I predict a negative coefficient on size.

Leverage (LEV) is measured as the natural logarithm of the ratio of a firm's interest-bearing debt to market value of equity at the end of the fiscal year.[38] The possibility of yielding extra profit from trading based on private information induces investors to spend resources on private information acquisition activities and the expected profit from trading on private information in the equity market increases with the firm's leverage, which implies a positive association between leverage and information asymmetry (Boot and Thakor, 1993). On the other hand, the Pecking Order theory of capital structure suggests a negative association between leverage and information asymmetry. Because of two different directions of relation as suggested by existing theories, I do not predict any explicit sign of the coefficient on leverage.

[36] Moreover, some empirical papers use return volatility as a proxy of information asymmetry. For example, Leuz and Verrecchia (2000) focus on several proxies for the information asymmetry component. One such proxy is share price/return volatility. They assume that smooth transitions in share prices reflect absence of asymmetry in information possession between the firm and shareholders or among investors.
[37] I also use unorthogonalized return volatility as an explanatory variable and find that the conclusions do not change.
[38] I also use book value of total assets in place of market value of equity to calculate leverage and find similar result.

Firms with high amount of unrecorded intangibles such as R&D intensive firms and firms with high growth opportunities typically have greater information asymmetries. The mandated accounting rule of expensing R&D investments creates ambiguity among investors about the value of R&D, thus increasing the information gap between management and investors (Mohd, 2005). Consistent with this logic, many studies demonstrate that R&D intensive firms have higher information asymmetry (Aboody and Lev, 2000; Barth and Kasznik, 1999; Barth et al., 2001; Boone and Raman, 2001). The findings of these studies imply that the incentives to generate private information about firms are increasing in the level of information asymmetry between firm and investors and in how much uncertainty there is about firm value among investors. Firms with high intangibles and growth opportunities are in general characterized by higher market-to-book ratio. Accordingly, I expect that firms with high market-to-book ratio will have greater information asymmetry. I calculate market-to-book (MB) ratio of a firm as the natural log of the market value of equity (closing stock price multiplied by the number of stock outstanding at fiscal year-end) divided by the book value of equity at the end of fiscal year. I predict a positive coefficient on market-to-book ratio.

Prior studies predict that spreads will be wider for firms whose securities are more actively traded by informed investors (Welker, 1995) and certain institutional investors (transient institutional investors) systematically trade on private information (Bollen and Busse, 2005). Institutional investors are deemed to have information advantage over uninformed investors because they devote substantial resources to private information acquisition and exploit their superior information processing ability.[39] To the extent that institutional ownership reasonably proxies for the trading interest of privately informed traders, firms with greater institutions in their ownership structure will have higher information asymmetry. On the other hand, institutional investors typically follow large firms about which information is abundant and freely available. This implies that the information advantage of informed traders will be lower in firms operating in richer information environment. Moreover, some types of institutional investors (dedicated institutional investors) are likely to hold their investment for a longer horizon and unlikely to trade on private information. To the extent that institutional investors are not privately informed or do not trade on private information, I expect that institutional

[39] Welker (1995) provides another explanation for information based trading by institutional investors. He argues that institutional investors enjoy economies of scale from information production activities which apparently make information acquisition less costly for them.

ownership will be negatively related to information asymmetry. Fehle (2004) examines the relation between bid-ask spreads and institutional ownership and finds that spreads are on average negatively related to the institutional shares of total equity outstanding due to some institutions being restricted in their trading. This relationship, however, reverses for certain types of institutions, namely banks and investment managers. Since the relationship between relative spreads and institutional ownership depends on the type of institutions, I do not make any directional prediction. I measure institutional ownership (INSTITUTE) as the proportion of outstanding shares held by institutional investors for a firm in a given year. Institutional investors include foreign investors, annuity trust account, investment trust account and life insurance companies' special accounts.

Previous studies find contradictory results on the relation between analyst activity and information asymmetry. Piotroski and Roulstone (2004) find that higher analyst following is associated with more firm-specific information available about a firm and more private information based trading. This finding is consistent with the idea that analysts following proxies for privately informed trade or signals information asymmetry. Contrary to this evidence, Roulstone (2003) finds that analyst following is positively associated with market liquidity implying that analysts provide more public information to the financial markets. Frankel and Li (2004) also provide evidence that increased analyst following is associated with reduced information asymmetry as measured by the bid-ask spread and insider trading profits. The former study suggests that analyst following is positively associated with information asymmetry while the later studies suggest the opposite. Thus, I do not make any directional prediction since the expected association between information asymmetry and analyst activity appears to be complicated. Number of analysts following the firm is a widely-used proxy for analyst activity in the accounting literature. So, I use the maximum number of individual analysts providing one-year-ahead forecasts for a firm in a given year as a proxy for analyst activity.

6.4 Sample Selection and Descriptive Statistics

I discuss sample selection criteria and the summary statistics for all the variables in this section.

6.4.1 Sample Selection Procedure

The sample period for this study spans the time period 2002-2012. My sample consists of only manufacturing companies listed in any one of the Japanese Stock Exchanges (Tokyo, Osaka, Nagoya, JASDAQ, etc.) and primarily covers all firms from 15 industries based on Nikkei two-digit industrial codes. I do not include financial institutions, insurance companies, and firms in service industries since earnings quality empirical models used in this study do not reflect their activities. Data for the dependent variable, variable of interest and control variables come from a variety of sources. I obtain the trades and quotes data from the Nikkei Tick by Tick Data provided by the Nikkei Digital Media Inc. in order to compute bid-ask spread. The trade and quotes data are available only for firms listed in Tokyo Stock Exchange. Accounting data come from Nikkei NEEDS Financial Quest Database, and stock price and return data come from Nikkei Portfolio Master Return Database.[40] I obtain institutional ownership data for the period 2004-2012 from Nikkei NEEDS CGES Database and analyst following data from IFIS Consensus Dataset. As the estimation of parameters for the Dechow and Dichev (2002) model requires lead and lag values of cash flows from operation, and measures of earnings quality require five annual residuals, I collect necessary data for the 18-year period (1996-2013) initially to compute earnings quality measures. After restricting my sample to firms with complete data for earnings quality measure by eliminating firm-years due to missing information on any of the required variables, I end up with 15,640 firm-year observations with earnings quality measures. I am able to calculate bid-ask spread for 10,620 firm-year observations after imposing a requirement of at least 150 days of non-zero ask and bid price. The final sample size varies across different specifications depending on particular variables used in the regression.

6.4.2 Descriptive Statistics

Table 6.1 presents summary distributional characteristics of regression variables used in tests of the association between information asymmetry and earnings quality. I winsorize all the

[40] Nikkei NEEDS Financial Quest Database and Nikkei Portfolio Master Return Database in Japan correspond to Compustat and CRSP in the U.S., respectively.

variables at the 1 and 99 percent levels to avoid the effects of influential outliers. Panel A of Table 6.1 shows that the mean (median) spread is 1% (0.6%) for a typical firm in a year with an inter-quartile range of 0.4% to 1.2%. Panel B provides descriptive information on two earnings quality measures and their components. Earnings quality measure based on Kasznik's absolute abnormal accrual model shows greater variability than earnings quality measure based on Dechow-Dichev accrual quality model. The correlation in Table 6.2 between the two proxies of earnings quality is 0.475 over the sample period. The correlation is not high enough to make one of these proxies redundant. Therefore, I consider both proxies in empirical analysis. Panel C lists summary statistics for eight innate determinants. The sample mean values for the first five variables are 10.605 for ASSET (log of total assets), 0.057 for VCFO, 0.109 for VSALES, 5.054 for OPCYCLE (or 156 days) and 20 percent for negative earnings (NEG). The mean value for INTANDUM suggests that only 4 percent of the sample firm-years report zero expenditure on R&D and advertising. For all sample firm-years (including those with INTAN = 0), the mean value of intangible intensity (INTAN) is 4.4 percent. Finally, the mean value of capital intensity (CAPITAL) is 32 percent.

Panel D presents descriptive statistics on firm characteristics and trading activity. The securities included in the sample have mean (median) price of around 6,304 (529) Yen and mean (median) trading volume of 533,222 (38,996) shares. As expected, the stock price and trading volume are highly skewed as the mean is much larger than the median. The average firm has a market capitalization of 128,434 million yen (untabulated), a market-to-book ratio of about 1.181, and 74.7% interest-bearing debt of market value of equity. I also find that about 16% shares are hold by institutional investors on average, and a firm is followed by five analysts.

Table 6.2 presents univariate Pearson correlations (Spearman rank correlations) below (above) the diagonal for the sample. The correlations between SPREAD and earnings quality measures are significantly positive, although somewhat moderate in magnitude. The Pearson correlation coefficient between SPREAD and DDSTD is 0.174, and between SPREAD and KZABS is 0.109. Note that since higher value of earnings quality measures denotes lower quality of earnings, the positive correlation coefficients indicate inverse relation between information asymmetry and earnings quality. This simple correlation provides preliminary evidence in favor of my hypothesis. Additionally, SPREAD is negatively correlated with PRICE, VOLUME, SIZE, INSTITUTE and ANALYST while positively correlated with VOLATILITY, MB, and LEV. All

the coefficients are statistically significant and indicate that information asymmetry is higher for firms with lower share price, lower trading volume, smaller size, lower institutional holdings, lower analyst following, higher return volatility, higher market-to-book ratio, and higher leverage. An examination of the correlations among the determinants of SPREAD reveals quite large correlation among some variables. For example, SIZE is highly positively correlated with VOLUME, INSTITUTE, and ANALYST. This implies that large firms have higher trading volume, higher institutional ownership, and greater analyst coverage. VOLUME is highly correlated with INSTITUTE and ANALYST, and there is also large correlation between INSTITUTE and ANALYST. The high (but not perfect) correlation among explanatory variables raises concern about multicollinearity problem. In order to test the robustness of the results in the presence of multicollinearity, I drop one of the highly correlated variables from regression models in several cases where I suspect that multicollinearity may be a concern. In all regression models, I am interested in the coefficient of earnings quality. So, high correlations among control variables do not make it more difficult to determine the effect of earnings quality on information asymmetry. A cursory review of above the diagonal values of Table 6.2 suggests that the Spearman rank correlation is qualitatively similar to Pearson correlation except some insignificant coefficients. Overall, the univariate correlation between SPREAD and each explanatory variable is significant, consistent with the findings of previous literature.

Table 6.1: Descriptive Statistics

This table reports the descriptive statistics of all the variables used for this study. All variables are winsorized at the bottom and top 1% levels. For the variables used in the regressions, the number of observations varies from 7,262 to 15,640 for the sample period 2002-2012. Only institutional ownership data is available for the period 2004-2012. All variables are defined in Appendix C.

Variable		Obs.	Mean	Std. Dev.	10%	Q1	Median	Q3	90%
Panel A: ***Information asymmetry measures***									
Quoted bid-ask spread	SPREAD	10,620	0.010	0.011	0.003	0.004	0.006	0.012	0.023
Panel B: ***Earnings quality measures***									
Dechow-Dichev accrual quality	DDSTD	15,640	0.024	0.019	0.008	0.013	0.019	0.030	0.045
Innate component	InnateEQ	15,640	0.024	0.011	0.014	0.018	0.022	0.028	0.035
Discretionary component	DiscEQ	15,640	-0.000	0.015	-0.013	-0.008	-0.002	0.005	0.016
Kasznik absolute abnormal accrual	KZABS	15,640	0.029	0.029	0.004	0.009	0.020	0.038	0.062
Innate component	InnateEQ	15,640	0.028	0.012	0.018	0.022	0.026	0.032	0.039
Discretionary component	DiscEQ	15,640	-0.000	0.026	-0.023	-0.016	-0.006	0.010	0.031
Panel C: ***EQ determinants***									
Total assets (in log)	ASSET	15,640	10.605	1.580	8.786	9.516	10.409	11.521	12.742
Cash flows volatility	VCFO	15,640	0.057	0.068	0.019	0.027	0.041	0.063	0.102
Sales volatility	VSALES	15,640	0.109	0.180	0.027	0.042	0.070	0.119	0.203
Operating Cycle (in log)	OPCYCLE	15,640	5.054	0.442	4.490	4.813	5.087	5.333	5.551
Incidence of negative earnings	NEG	15,640	0.203	0.247	0.000	0.000	0.200	0.400	0.600
Intangible intensity	INTAN	15,640	0.044	0.241	0.003	0.009	0.023	0.405	0.081
Absence of reported intangible	INTANDUM	15,640	0.040	0.196					
Capital intensity	CAPITAL	15,640	0.316	0.137	0.149	0.220	0.309	0.405	0.495
Panel D: ***Control variables***									
Stock price (in Yen)	PRICE	15,190	6,304	34,167	146	267	529	1,170	2,658
Trading volume (in shares)	VOLUME	15,190	533,222	1,453,554	1,439	5,672	38,996	300,849	1,372,156
Stock return volatility	VOLATILITY	15,190	8.501	7.993	2.112	3.438	5.930	10.447	17.999
Firm size (in log)	SIZE	15,190	9.832	1.783	7.719	8.510	9.597	10.916	12.328
Market-to-book ratio	MB	15,160	1.181	0.911	0.431	0.620	0.923	1.417	2.180
Leverage	LEV	15,148	0.747	1.021	0.001	0.079	0.368	0.971	1.984
Institutional ownership	INSTITUTE	12,517	16.012	16.073	0.110	1.990	10.630	26.420	40.740
Number of analyst following	ANALYST	7,262	4.957	4.729	1	1	3	7	13

Table 6.2: Correlation Matrix

This table provides Pearson correlation coefficients (Spearman rank correlation coefficients) below (above) the diagonal. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Variable	SPREAD	DDSTD	KZABS	PRICE	VOLUME	VOLATILITY	SIZE	MB	LEV	INSTITUTE	ANALYST
SPREAD		0.174***	0.084***	-0.530***	-0.603***	0.307***	-0.821***	0.389***	0.312***	-0.718***	-0.540***
DDSTD	0.174***		0.365***	0.065***	-0.086***	0.294***	-0.206***	0.071***	-0.029***	-0.164***	-0.098***
KZABS	0.109***	0.475***		0.006	-0.059***	0.177***	-0.103***	0.034***	-0.018**	-0.070***	-0.032***
PRICE	-0.375***	0.073***	0.076***		-0.039***	-0.293***	0.498***	0.389***	-0.577***	0.451***	0.264***
VOLUME	-0.588***	-0.104***	-0.080***	-0.229***		0.033***	0.722***	0.383***	0.053***	0.655***	0.641***
VOLATILITY	0.308***	0.311***	0.217***	-0.118***	0.040***		-0.291***	0.008	0.310***	-0.154***	-0.088***
SIZE	-0.779***	-0.198***	-0.114***	0.352***	0.717***	-0.266***		0.480***	-0.310***	0.818***	0.780***
MB	0.351***	0.121***	0.070***	0.388***	0.324***	0.050***	0.459***		-0.185***	0.326***	0.320***
LEV	0.169***	-0.043***	-0.055***	-0.380***	0.154***	0.203***	-0.135***	-0.089***		-0.257***	-0.014
INSTITUTE	-0.653***	-0.164***	-0.080***	0.296***	0.613***	-0.124***	0.794***	0.321***	-0.099***		0.657***
ANALYST	-0.468***	-0.083***	-0.027**	0.124***	0.602***	-0.088***	0.785***	0.253***	0.027***	0.629***	

6.5 Empirical Results

6.5.1 Preliminary Analysis of Information Asymmetry by Earnings Quality Groups and Size Groups

The first set of analysis of the detailed empirical investigation of my primary hypothesis deals with the univariate and bivariate analysis of the relation between information asymmetry and earnings quality. Table 6.3 reports the result of elementary univariate analysis of information asymmetry by earnings quality groups, and bivariate analysis of information asymmetry by size groups and earnings quality groups within each size groups. At first, I form quintile portfolios of sample firms each year for two measures of earnings quality. Since the values of earnings quality measures are inversely related to the quality of earnings, firms placed in first group have best quality earnings and firms placed in fifth group have worst quality earnings. As I move from first group of earnings quality to last group of earnings quality, the quality of earnings deteriorates gradually, and consequently, I expect a steady increase in information asymmetry as proxied by relative bid-ask spread to be consistent with my primary hypothesis. Then I create five indicator variables, EQ1 through EQ5, based on the quintile ranking of each earnings quality groups. For example, the indicator variable EQ1 takes the value of one for all firms placed in first earnings quality groups and zero otherwise, while the indicator variable EQ5 takes the value of one for all firms placed in fifth earnings quality group and zero otherwise. For bivariate analysis, the sample firms are firstly grouped into quintile portfolios each year on the basis of firm size measured as the natural log of market capitalization, and secondly into earnings quality quintiles created within each size group each year on the basis of the magnitude of earnings quality measures. The first size quintile S1 includes smallest firms and fifth size quintile S5 comprises largest firms. Lehman and Modest (1994) examine the characteristic of spread across different size-decile groups in the TSE and find that largest firms have lowest spread. Consistent with this evidence, the correlation matrix presented in Table 6.2 shows that both Pearson and Spearman rank correlation coefficients between spread and size are highly negative and statistically significant. Moreover, large firms are supposed to have rich information environment, and information advantage of privately informed investors appears to be low in larger firms compared to smaller firms. The significantly high negative correlation between spread and size motivates me to conduct a bivariate analysis of the association between information asymmetry and earnings quality conditioned on firm size. Firm size also serves as a reasonable proxy for a firm's

information environment. Theoretical studies predict that the adverse impact of poor earnings quality on information asymmetry may be more severe for small firms with seemingly poor information environment compared to large firms deemed to have rich information environment. Table 6.3 reports the results of univariate and bivariate analysis of the association between information asymmetry and earnings quality. Panel A and B reports the results of univariate analysis while Panel C and D reports the results of the bivariate analysis.

Panel A presents the coefficients from a regression of relative quoted bid-ask spread on DDSTD earnings quality indicator variables. The result shows a monotonic increase in the spread from 0.008 (0.8%) in highest earnings quality group EQ1 to 0.013 (1.3%) in lowest earnings quality group EQ5, which is consistent with primary hypothesis predicting a negative relation between information asymmetry and earnings quality. The result also shows that the difference in spread for firms in all the lower earnings quality groups as compared to the firms in EQ1 is statistically significant at the 1 percent level. Panel B presents similar analysis from a regression of relative quoted bid-ask spread on KZABS earning quality indicator variables. Consistent with my primary hypothesis, I find that the spread increases from 0.009 (0.9%) in highest earnings quality group EQ1 to 0.012 (1.2%) in lowest earnings quality group EQ5 though the increase is not monotonic. I also find that the spread is more pronounced for firms in lower EQ groups as compared to the spread for firms in EQ1 group. For example, the difference in spread for firms in EQ2 and EQ3 as compared to the firms in EQ1 is not statistically significant but the difference in spread for firms in EQ4 and EQ5 as compared to the firms in EQ1 is statistically significant at the 1 percent level. Together, the results in Panel A and B suggest that the level of information asymmetry is inversely related to both measures of earnings quality.

Panel C presents the results of bivariate analysis where quintiles are formed for the sample firms on the basis of firm size and the magnitude of DDSTD earnings quality measure.[41] This panel provides the mean of relative bid-ask spread for each size group across different earnings quality quintiles formed within each size group. Specifically, Panel C shows how average spread varies across earnings quality groups after controlling for size. Consistent with my prediction, I observe that after controlling for size, the difference in mean spread between

[41]Alternatively all the sample firms are sorted each year independently on the basis of the magnitude of earnings quality measures and size measures. The firms are next placed in earnings quality quintiles (EQ1 through EQ5) and size quintiles (S1 through S5). Then I compute mean spread for all firms placed in each intersection of five earnings quality groups and five size quintiles (5X5=25 EQ-Size intersection) and redo similar analysis like Panel C. This two-way independent sort produces materially similar results.

best (EQ1) and worst (EQ5) earnings quality group is statistically significant at 1% level. However, the increase in mean spread is monotonic only for firms in smallest size group (S1). For firms in largest size group (S5), the mean spread is same for first three earnings quality groups representing best to moderate earnings quality. The difference in mean spread between best and worst earnings quality groups also decreases gradually as I move from S1 to S5. This pattern clearly suggests that the association between information asymmetry and earnings quality is more pronounced for small firms relative to large firms. On the other hand, I observe that average spread decreases gradually from S1 (smallest size group) to S5 (largest size group) for each earnings quality group, and the difference in mean spread between smallest size group and largest size group are statistically significant at 1 percent level. For example, the difference in mean spread between largest and smallest firms in both best earnings quality group (EQ1) and worst earnings quality group (EQ5) in absolute value are 0.016 (1.6%) and 0.024 (2.4%) respectively. Moreover, as I move from best earnings quality group to worst earnings quality group, the difference in mean spread in absolute value between largest and smallest firms increases monotonically. Panel D presents similar bivariate analysis for KZABS earnings quality measures and shows similar results. For example, the difference in mean spread between S1 (smallest firms) and S5 (largest firms) for each earnings quality group is statistically significant at 1 percent level and the difference in spread between EQ1 (best earnings quality) and EQ5 (worst earnings quality) after controlling for size is either significant at 1 percent level or marginally significant at 10 percent level (for largest size group).[42] Collectively, the results in Panel C and D suggest that earnings quality has larger impact on the level of information asymmetry for a subsample of small firms in comparison with large firms. I explore the issue further in the next section of regression analysis.

In sum, the results reported in Table 6.3 suggest that information asymmetry as proxied by the relative bid-ask spread is increasing with deteriorating earnings quality and the effect of earnings quality on information asymmetry is more pronounced for small firms presumed to have poor information environment relative to larger firms supposed to have rich information environment. Overall, both univariate and bivariate analysis provide preliminary evidence consistent with my primary hypothesis.

[42] The mean spread increases gradually from best earnings quality group to worst earnings quality group only for smallest firm group (S1). For the largest firm group (S5), the mean spread is same for first four earnings quality groups and only differs from worst earnings quality group (EQ5).

Table 6.3: Univariate and Bivariate Analysis of the Association between Information Asymmetry and Earnings Quality

Panel A and B report the coefficients of regression of information asymmetry variable on earnings quality indicator variables formed on the basis of quintile ranking of two measures of earnings quality for the period 2002-2012. Quintile portfolios are formed each fiscal year separately for the two measures of earnings quality (DDSTD and KZABS) and indicator variables, EQ1 through EQ5, are defined for each quintile group. The indicator variable EQ1 equals one for all firms in Quintile 1 and equals zero otherwise while EQ5 equals one for firms in Quintile 5 and equals zero otherwise. Panel C and D provide the mean difference of information asymmetry variable in Quintile 1 to Quintile 5 portfolios of two earnings quality measures across different size quintiles. *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Panel A: Regression coefficients of relative bid-ask spread on earnings quality indicator variables created based on the quintile ranking of Dechow-Dichev (2002) earnings quality measure (DDSTD)

Variable	Quintiles based on DDSTD				
	(EQ1)	(EQ2)	(EQ3)	(EQ4)	(EQ5)
	Best EQ				Worst EQ
SPREAD	0.008	0.009	0.010	0.011	0.013
Diff. from EQ1		0.001***	0.002***	0.003***	0.005***
(t-statistic)		(3.45)	(6.45)	(8.15)	(13.75)

Panel B: Regression coefficients of relative bid-ask spread on earnings quality indicator variables created based on the quintile ranking of Kasznik version of modified Jones (1991) earnings quality measure (KZABS)

Variable	Quintiles based on KZABS				
	(EQ1)	(EQ2)	(EQ3)	(EQ4)	(EQ5)
	Best EQ				Worst EQ
SPREAD	0.009	0.010	0.010	0.011	0.012
Diff. from EQ1		0.001	0.001	0.002***	0.003***
(t-statistic)		(1.14)	(1.46)	(3.68)	(7.83)

Panel C: Mean of relative bid-ask spread for Quintile 1 to Quintile 5 portfolios of Dechow-Dichev (2002) earnings quality measure (DDSTD) across size quintiles.

	EQ Quintiles (EQ = DDSTD)					Mean diff.	(t-
Size Quintiles	(EQ1)	(EQ2)	(EQ3)	(EQ4)	(EQ5)	(EQ5) – (EQ1)	statistic)
(S1)	0.019	0.022	0.023	0.025	0.028	0.009***	(9.67)
(S2)	0.009	0.011	0.013	0.013	0.016	0.007***	(10.27)
(S3)	0.006	0.007	0.008	0.008	0.010	0.004***	(10.40)
(S4)	0.004	0.005	0.005	0.006	0.006	0.002***	(9.98)
(S5)	0.003	0.003	0.003	0.004	0.004	0.001***	(6.21)
Mean diff. (S5) – (S1)	-0.016***	-0.019***	-0.020***	-0.021***	-0.024***		
(t-statistic)	(-28.22)	(-27.53)	(-29.85)	(-29.89)	(-28.84)		

Panel D: Mean of relative bid-ask spread for Quintile 1 to Quintile 5 portfolios of Kasznik version of modified Jones (1991) earnings quality measure (KZABS) across size quintiles.

	EQ Quintiles (EQ = KZABS)					Mean diff.	(t-
Size Quintiles	(1)	(2)	(3)	(4)	(5)	(EQ5) – (EQ1)	statistic)
(S1)	0.021	0.022	0.023	0.024	0.026	0.005***	(5.31)
(S2)	0.011	0.011	0.011	0.013	0.015	0.004***	(6.88)
(S3)	0.007	0.007	0.007	0.008	0.010	0.003***	(5.24)
(S4)	0.005	0.005	0.005	0.005	0.006	0.001***	(4.64)
(S5)	0.003	0.003	0.003	0.003	0.004	0.001*	(1.46)
Mean diff. (S5) – (S1)	-0.018***	-0.019***	-0.020***	-0.021***	-0.022***		
(t-statistic)	(-28.93)	(-27.94)	(-27.31)	(-29.07)	(-29.75)		

6.5.2 Regression Analysis of Information Asymmetry on Earnings Quality

In this section, I examine the relation between information asymmetry and earnings quality after controlling for firm characteristics known to be systematically associated with the bid-ask spread. Specifically, I control for the effects of share price, trading volume, stock return volatility, firm size, market-to-book ratio, leverage, institutional ownership, and analyst following. I begin multivariate regression analysis with the regression of relative bid-ask spread on several economic determinants of spread. Table 6.4 reports the results of the base version of the regression where the determinants of spread appear both individually and jointly. The predicted sign for each coefficient is indicated adjacent to the variable name. Column 1 to 6 presents the coefficients on PRICE, VOLUME, VOLATILITY, SIZE, MB, and LEV individually.[43] In Column 7 the coefficients of all six variables are presented together. The coefficients on INSTITUTE and ANALYST are presented in Column 8 and 9 respectively. Finally, Column 10 presents the coefficients of all identified determinants of spread together. All variables are defined in Appendix C, and all variables are winsorized at the bottom and top 1% levels of their respective distribution. The sample period and the number of observation vary across Columns depending on particular variables used in the regression.[44]

In empirical accounting research for which panel data are frequently used, cross-sectional and time-series dependence are likely in many applications. In such settings, calculating well-specified standard errors or test statistics that correct for cross-sectional and time-series dependence is essential for drawing valid inference because relying on methods that is robust to only one form of dependence may produce misspecified test statistic with spurious inference. Gow et al. (2010) suggest that two-way cluster-robust standard errors produce well-specified test statistics that are robust to both cross-sectional and time-series dependence in the variables of interest in a variety of accounting research settings. This finding is different from Petersen (2009) who concludes that clustering standard errors by both firm and time appear unnecessary in two finance applications he examined. The difference in findings of these two studies is likely to arise from the fact that accounting variables exhibit greater dependence both over time and in

[43] I use unorthogonalized volume and volatility in the base version because earnings quality variable is not included here. The result is same even if I use orthogonalized volume and volatility measure.

[44] Institutional ownership data is available for the period 2004-2012 from Nikkei NEEDS CGES database. Accordingly, the sample period is 2004-2012 for all models where institutional ownership variable is included. When I include both institutional ownership and analyst following variable, the sample size drops to almost half of initial sample because of small number of firms for which analyst following data is available.

cross-section than finance variables (Gow et al., 2010). Therefore, I calculate *t*-statistics on the basis of two-way (year and industry) clustered robust standard errors and present in parentheses. The results shown in Column 1 to 6 where PRICE, VOLUME, VOLATILITY, SIZE, MB, and LEV appear individually suggest that spread is significantly lower for firms with higher stock price, higher trading volume, larger size, lower return volatility, lower market-to-book ratio and lower leverage. All the coefficients are consistent with predicted sign and statistically significant at 1 percent level. Column 7 includes all these variables and shows that all the variables retain their predicted sign with SIZE losing its significance[45] and MB is marginally significant at 10 percent level. The adjusted R^2 is very high at 70.39% implying that these variables explain a significant portion of the variability of SPREAD. From Column 8 and 9, I find that the coefficients on INSTITUTE and ANALYST are significantly negative. The negative coefficient on INSTITUTE is inconsistent with the popular notion that all institutions are sophisticated investors who frequently trade on the basis of private information.[46] The negative coefficient on ANALYST is consistent with the findings of Brown et al. (2004) who find that analyst coverage is negatively related to information based trading.[47] Finally in Column 10, I regress SPREAD on all eight determinants and find that all the variables are at least marginally significant with expected sign except ANALYST, which changes sign from negative to positive. One possible explanation for this may be very high correlation between SIZE and ANALYST.[48] In an untabulated analysis, I find that when size is excluded from the regression, there is a strong negative relation between SPREAD and ANALYST. The decrease in adjusted R^2 in Column 10 may be due to small sample size compared to Column 7. Overall, the results reported in Table 6.4 suggest that all the determinants of SPREAD that has been identified based on a review of prior literature have significant relationship with SPREAD and explain a significant portion of cross-sectional variation in SPREAD.

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[45] The Pearson correlation coefficient (Spearman rank correlation coefficient) between VOLUME and SIZE is 0.717 (0.722). Because of this high correlation, the effect of size may be subsumed by the effect of trading volume.

[46] Brown and Hillegeist (2007) and Bhattacharya et al. (2013) find significant negative relation between information asymmetry and institutional ownership.

[47] Bhattacharya et al. (2013) find significant negative coefficient on analyst following in all specifications while Brown and Hillegeist (2007) report negative but insignificant coefficient on analyst following. Brown and Hillegeist (2007) cite (footnote 19, p-460) very high correlation between analyst following and size, and the resulting multi-collinearity as the possible reason for the lack of significance for analysts.

[48] Correlation matrix in Table 6.2 suggests that SIZE, INSTITUTE and ANALYST are highly correlated with each other. This is expected because prior studies document that institutional shareholders and analysts typically follow large firms. This multi-collinearity could be responsible for the change of the sign of coefficient on ANALYST.

Table 6.4: Regression of Quoted Bid-Ask Spread on Several Economic Determinants of Spread

This table reports the results of the base version of the regression of relative bid-ask spread on several economic determinants of spread entered the regression both individually and jointly. The predicted sign for each coefficient is indicated adjacent to the variable name. Column 1 to 6 presents the coefficients on PRICE, VOLUME, VOLATILITY, SIZE, MB, and LEV individually and Column 7 presents the coefficients of all six variables together. The coefficients on INSTITUTE and ANALYST are presented in Column 8 and 9 respectively. Finally, Column 10 presents the coefficients of all identified determinants of information asymmetry together. All variables are defined in Appendix C. The sample period is 2002-2012 (for Column 1-7 and 9) and 2004-2012 (for Column 8 and 10). The number of observation varies across Columns depending on particular variables used in the regression. All continuous variables are winsorized at the bottom and top 1% levels of their respective distribution. t-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Variable	Expected Sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PRICE	(-)	-0.221*** (-5.98)						-0.284*** (-8.27)			-0.211*** (-5.32)
VOLUME	(-)		-0.204*** (-21.25)					-0.248*** (-8.98)			-0.193*** (-6.39)
VOLATILITY	(+)			0.310*** (4.91)				0.250*** (3.65)			0.147* (1.79)
SIZE	(-)				-0.385*** (-24.20)			-0.023 (-0.50)			-0.082* (-1.89)
MB	(+)					0.483*** (10.17)		0.069* (1.70)			0.098* (1.85)
LEV	(+/-)						0.042*** (5.72)	0.011*** (3.31)			0.015*** (4.11)
INSTITUTE	(+/-)								-0.033*** (-15.82)		-0.003** (-2.36)
ANALYST	(+/-)									-0.061*** (-14.00)	0.024*** (8.16)
Intercept		-3.509*** (-13.59)	-2.579*** (-15.95)	-5.482*** (-53.17)	-0.917*** (-5.01)	-4.924*** (-67.30)	-4.857*** (-56.45)	-0.393 (-1.43)	-4.361*** (-52.15)	-5.005*** (-55.50)	-0.866*** (-2.90)
N		10,517	10,517	10,517	10,517	10,502	10,490	10,490	8,701	6,132	5,702
Adjusted R^2		14.06%	34.53%	9.48%	60.73%	12.30%	2.85%	70.39%	42.65%	21.88%	49.68%

Since institutional ownership data is available for the sample period 2004-2012 and analyst following data is available for few firms, the number of observations in Column 8 to 10 is low compared to Column 1 to 7. The inclusion of all eight determinants reduces sample size drastically. For this reason, in the subsequent analyses, I present two sets of results of regression analysis; one set controls for the effect of PRICE, VOLUME, VOLATILITY, SIZE, MB and LEV while other set controls for all eight determinants.

Table 6.5 and 6.6 report the results of regression analysis that investigate how earnings quality is related to the level of information asymmetry. Specifically, I estimate the following regression model which includes the magnitude of earnings quality measures as a variable of interest and other determinants of spread as control variables. In the model specification, I lag explanatory variables by one year relative to SPREAD to avoid picking up a mere contemporaneous association between information asymmetry and earnings quality.[49]

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 PRICE_{i,t-1} + \alpha_3 VOLUME_{i,t-1} + \alpha_4 VOLATILITY_{i,t-1} + \alpha_5 SIZE_{i,t-1} + \alpha_6 MB_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 INSTITUTE_{i,t-1} + \alpha_9 ANALYST_{i,t-1} + \mu_{i,t} \qquad \text{Eq. (6.3)}$$

Here, SPREAD represents relative bid-ask spread, the proxy for information asymmetry. EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model (DDSTD) and Kasznik version of modified Jones (1991) model (KZABS). All other control variables are defined in Appendix C. I calculate *t*-statistics on the basis of two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and present in parentheses.

The intuition for applying lead-lag research design runs as follows. This approach ensures that for the vast majority of sample firms, investors can estimate earnings quality measures by using publicly available information prior to making investment decision. Japanese financial reporting system suggests that stock exchanges require firms to broadcast a summary of important financial statement items, such as earnings, dividends, and management forecast of next year's earnings within 45 days after the end of the fiscal year. However, this summary report is unaudited and doesn't contain detailed information required by the market participants to measure earnings quality at that point in time. After the announcement of this summary report, firms are required to publish audited annual financial statements within three months (90 days)

[49] In an alternative research design I lag only variable of interest (earnings quality) by one year and measure other determinants of spread over the same measurement period of spread to maintain consistency between spread and its determinants, and find that all the results remain unchanged.

from the end of the fiscal year. Investors can access these statements on firm's websites or on the Electronic Disclosure for Investors' NETweork (EDINET) system and precisely estimate earnings quality using audited financial statement information for a fiscal year three months after the end of that fiscal year. Since firms having March fiscal year-end comprise more than 75% of listed firms in Japan, I assume that investors become aware of the quality of annual earnings at the end of June for most firms. So, in light of the Japanese financial reporting system, my spread calculation begins at the start of July, three months after the fiscal year end. The following example will clarify my research design: the bid-ask spread of year 2001 which is calculated over twelve months period (from July 2000 to June 2001) is paired with earnings quality measure of year 2000 which is calculated using financial statement information of year 2000 (accounting or financial statement period ends in March 2000)[50] and is assumed to be known by the investors at the end of June 2000.

Column 1 to 4 of Table 6.5 report the results of the regression of spread on DDSTD earnings quality measure after controlling for determinants of spread. The predicted sign for each coefficient is indicated adjacent to the variable name. Consistent with my hypothesis, I find that the coefficient on earnings quality is positive and statistically significant at the 1 percent level irrespective of the varying number of control variables in each specification. The finding suggests that earnings quality is significantly and inversely associated with information asymmetry. The number of observation varies across specifications because of different sample period. The adjusted R^2 ranges between 49.66% and 70.48%.

[50] This is a simple illustration of the research design. In reality, I need at least six prior years information to estimate DDSTD earnings quality measure in any year.

Table 6.5: Regression of Quoted Bid-Ask Spread on DDSTD and Several Control Variables Shown to be Associated with Spread

This table reports estimation of Eq. (6.3)

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 PRICE_{i,t-1} + \alpha_3 VOLUME_{i,t-1} + \alpha_4 VOLATILITY_{i,t-1} + \alpha_5 SIZE_{i,t-1} + \alpha_6 MB_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 INSTITUTE_{i,t-1} + \alpha_9 ANALYST_{i,t-1} + \mu_{i,t} \quad \text{Eq. (6.3)}$$

where SPREAD represents relative bid-ask spread. EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model. Column 1 to 4 of this table reports the results of the regression of relative spread on DDSTD earnings quality measure after controlling for the effects of several determinants of spread. Column 5 to 10 presents the results of the effect of information environment on the association between earnings quality and information asymmetry where I interact earnings quality measures with a dummy variable (HIED) representing firms with high information environment. HIED takes the value of one for firms above the median value of firm size, institutional ownership and analyst following, respectively, and zero otherwise. The predicted sign for each coefficient is indicated adjacent to the variable name. All variables are defined in Appendix C. The sample period and the number of observation vary across Columns depending on particular variables used in the regression. All continuous variables are winsorized at the bottom and top 1% levels of their respective distribution. t-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Variable	Expected Sign					Firm Size		Institutional Ownership		Analyst Following	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EQ	(+)	9.705*** (8.80)	8.984*** (9.77)	8.861*** (5.50)	6.257*** (5.26)	13.040*** (10.13)	12.125*** (9.18)	11.976*** (10.25)	10.956*** (6.85)	11.212*** (7.12)	9.059*** (6.67)
EQ*HIED	(-)					-6.638*** (-5.51)	-7.792*** (-4.63)	-6.630*** (-5.35)	-6.280*** (-3.80)	-5.737*** (-3.93)	-6.590*** (-4.50)
PRICE	(-)	-0.291*** (-8.44)	-0.273*** (-7.79)	-0.282*** (-5.61)	-0.215*** (-5.48)	-0.291*** (-8.48)	-0.215*** (-5.76)	-0.267*** (-7.81)	-0.219 (-5.41)	-0.282*** (-5.58)	-0.215*** (-5.65)
VOLUME	(-)	-0.251*** (-9.41)	-0.226*** (-8.98)	-0.267*** (-6.25)	-0.197*** (-6.47)	-0.250*** (-9.30)	-0.190*** (-6.08)	-0.223*** (-8.64)	-0.194*** (-6.02)	-0.264*** (-6.03)	-0.194*** (-6.34)
VOLATILITY	(+)	0.236*** (3.36)	0.205*** (2.68)	0.200** (2.16)	0.141* (1.67)	0.232*** (3.30)	0.139* (1.66)	0.197** (2.58)	0.135 (1.59)	0.196** (2.14)	0.136 (1.65)
SIZE	(-)	-0.014 (-0.32)	-0.038 (-0.97)	0.002 (0.03)	-0.074* (-1.77)	0.016 (0.37)	-0.046 (-1.23)	-0.034 (-0.89)	-0.068 (-1.60)	0.007 (0.12)	-0.072* (-1.72)
MB	(+)	0.061 (1.56)	0.078* (1.79)	0.078 (1.51)	0.093* (1.81)	0.063* (1.67)	0.095* (1.96)	0.060 (1.43)	0.084* (1.69)	0.079 (1.55)	0.096* (1.89)
LEV	(+/-)	0.013*** (3.57)	0.011*** (3.55)	0.019*** (4.47)	0.016*** (4.16)	0.011*** (3.03)	0.014*** (4.16)	0.010*** (3.42)	0.015*** (4.11)	0.019*** (4.58)	0.016*** (4.55)
INSTITUTE	(+/-)		-0.002** (-2.14)		-0.003** (-2.17)		-0.002** (-2.20)	0.000 (0.46)	-0.001 (-0.73)		-0.002* (-1.95)

ANALYST	(+/-)			0.022*** (7.55)	0.023*** (7.32)		0.017*** (4.88)		0.021*** (6.71)	0.030*** (9.48)	0.031*** (10.88)
Intercept		-2.847*** (-8.50)	-2.710*** (-8.77)	-3.186*** (-8.41)	-2.843*** (-7.85)	-3.151*** (-9.78)	-3.146*** (-10.15)	-2.826*** (-9.41)	-2.920*** (-8.16)	-3.282*** (-8.72)	-2.934*** (-8.81)
N		10,425	8,631	6,085	5,043	10,425	5,043	8,631	5,043	6,085	5,043
Adjusted R^2		70.48%	68.64%	54.49%	49.66%	71.27%	50.82%	69.41%	50.49%	55.22%	50.68%
F-stat (p value) H_0: EQ + EQ*HIED = 0 H_1: EQ + EQ*HIED ≠ 0						24.61*** (0.000)	9.30*** (0.003)	21.45*** (0.000)	12.22*** (0.001)	7.14*** (0.008)	3.39* (0.068)

Table 6.6: Regression of Quoted Bid-Ask Spread on KZABS and Several Control Variables Shown to be Associated with Spread

This table reports estimation of Eq. (6.3)

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 EQ_{i,t-1} + \alpha_2 PRICE_{i,t-1} + \alpha_3 VOLUME_{i,t-1} + \alpha_4 VOLATILITY_{i,t-1} + \alpha_5 SIZE_{i,t-1} + \alpha_6 MB_{i,t-1} + \alpha_7 LEV_{i,t-1} + \alpha_8 INSTITUTE_{i,t-1} + \alpha_9 ANALYST_{i,t-1} + \mu_{i,t} \quad \text{Eq. (6.3)}$$

where SPREAD represents relative bid-ask spread. EQ is a measure of inverse earnings quality calculated from Kasznik version of modified Jones (1991) model. Column 1 to 4 of this table reports the results of the regression of relative spread on KZABS earnings quality measure after controlling for the effects of several determinants of spread. Column 5 to 10 presents the results of the effect of information environment on the association between earnings quality and information asymmetry where I interact earnings quality measure with a dummy variable (HIED) representing firms with high information environment. HIED takes the value of one for firms above the median value of firm size, institutional ownership and analyst following, respectively, and zero otherwise. The predicted sign for each coefficient is indicated adjacent to the variable name. All variables are defined in Appendix C. The sample period and the number of observation vary across Columns depending on particular variables used in the regression. All continuous variables are winsorized at the bottom and top 1% levels of their respective distribution. t-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Variable	Expected Sign					Firm Size		Institutional Ownership		Analyst Following	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EQ	(+)	4.750*** (6.34)	4.149*** (6.34)	4.264*** (4.21)	2.915*** (3.92)	7.048*** (8.82)	6.986*** (6.86)	6.365*** (9.38)	6.345*** (7.17)	5.786*** (6.46)	4.770*** (5.46)
EQ*HIED	(-)					-4.269*** (-4.95)	-5.141*** (-4.11)	-4.119*** (-5.51)	-4.301*** (-4.01)	-3.367*** (-3.94)	-3.967*** (-3.76)
PRICE	(-)	-0.287*** (-8.22)	-0.267*** (-7.23)	-0.278*** (-5.45)	-0.210*** (-5.21)	-0.287*** (-8.23)	-0.212*** (-5.11)	-0.262*** (-7.18)	-0.213*** (-5.05)	-0.278*** (-5.40)	-0.211*** (-5.14)
VOLUME	(-)	-0.249*** (-9.00)	-0.222*** (-7.99)	-0.263*** (-6.12)	-0.193*** (-6.12)	-0.248*** (-8.87)	-0.188*** (-5.58)	-0.219*** (-7.68)	-0.190*** (-5.65)	-0.262*** (-5.92)	-0.190*** (-5.81)
VOLATILITY	(+)	0.241*** (3.47)	0.210*** (2.75)	0.201** (2.18)	0.141* (1.66)	0.238*** (3.42)	0.139 (1.65)	0.205*** (2.67)	0.136 (1.59)	0.200** (2.17)	0.138 (1.65)
SIZE	(-)	-0.021 (-0.44)	-0.046 (-1.08)	-0.006 (-0.11)	-0.082* (-1.83)	0.003 (0.06)	-0.057 (-1.36)	-0.043 (-1.01)	-0.075 (-1.65)	-0.003 (-0.05)	-0.080* (-1.79)
MB	(+)	0.066 (1.60)	0.083* (1.88)	0.082 (1.55)	0.096* (1.83)	0.066 (1.64)	0.096* (1.91)	0.068 (1.61)	0.086* (1.71)	0.084 (1.55)	0.098* (1.85)
LEV	(+/-)	0.012*** (3.56)	0.010*** (3.58)	0.019*** (4.50)	0.015*** (4.27)	0.011*** (3.17)	0.013*** (4.19)	0.010*** (3.42)	0.015*** (4.22)	0.019*** (4.54)	0.015*** (4.55)
INSTITUTE	(+/-)		-0.003** (-2.18)		-0.003** (-2.30)		-0.003** (-2.28)	-0.001 (-0.66)	-0.001 (-1.16)		-0.003** (-2.13)

ANALYST	(+/-)			0.022*** (7.62)	0.023*** (7.66)		0.019*** (5.42)		0.021*** (6.67)	0.028*** (8.82)	0.030*** (9.64)
Intercept		-2.707*** (-7.93)	-2.567*** (-8.09)	-3.043*** (-8.02)	-2.738*** (-7.59)	-2.948*** (-8.98)	-2.995*** (-9.23)	-2.666*** (-8.65)	-2.824*** (-8.12)	-3.111*** (-8.36)	-2.801*** (-8.00)
N		10,425	8,631	6,085	5,043	10,425	5,043	8,631	5,043	6,085	5,043
Adjusted R^2		70.52%	68.57%	54.39%	49.59%	71.12%	50.57%	69.11%	50.29%	54.94%	50.37%
F-stat (p value) H_0: EQ + EQ*HIED = 0 H_1: EQ + EQ*HIED ≠ 0						8.00*** (0.005)	3.91** (0.050)	7.61*** (0.007)	5.80** (0.017)	3.74* (0.055)	0.80 (0.378)

Previous studies suggest that the benefit of acquiring private information is greater for firms operating in poor information environment. Botosan (1997) does not find an association between disclosure level and the cost of equity capital for firms with rich information environments.[51] In contrast, Bhattacharya et al. (2013) find that poor earnings quality is associated with higher information asymmetry for firms operating in both richer and poorer information environment, but the effect of earnings quality on information asymmetry is less pronounced for firms with high information environment. Larger firms, firms with high institutional ownership and firms with high analyst following are associated with more information production and higher sophisticated user participation. Thus, these firm characteristics serve as reasonable proxies for the firm's information environment. In order to test the prediction that the impact of earnings quality on information asymmetry may differ between firms with high information environment and firms with poor information environment, I interact earnings quality measures with a dummy variable (HIED) representing firms with high information environment. HIED takes the value of one for firms above the median value of firm size, institutional ownership and analyst following, respectively, and zero otherwise.[52] Column 5 to 10 of Table 6.5 presents the results of this additional analysis where the coefficient on earnings quality captures the magnitude of the association between earnings quality and information asymmetry for a subsample of firms with poor information environment and the coefficient on interaction term implies the difference in the magnitude of the association between earnings quality and information asymmetry between firms with poor and high information environment. The sum of the coefficients on earnings quality and interaction term captures the magnitude of the effect of earnings quality on information asymmetry for a subsample of firms with high information environment. From Column 5 where I use firm size as a reasonable proxy for firm's information environment, I find that the coefficient on EQ is positive and statistically significant at the 1 percent level, suggesting that poor earnings quality is related with higher information asymmetry for the subsample of small firms. I also find that the impact of earnings quality on information asymmetry differs between small and large firms. The coefficient on the interaction term between EQ and size is significantly negative, implying that the association

[51] Botosan (1997) finds that there is no association between disclosure level and the cost of equity capital overall. However, greater disclosure is associated with a lower cost of equity capital for firms that attract a low analyst following.

[52] When I use the information environment dummy to proxy for the main effect of information environment instead of the continuous variable, I find negative and significant coefficient on information environment dummy.

between earnings quality and information asymmetry is less pronounced for larger firms. The sum of the coefficients on earnings quality and interaction term, which reflects the earnings quality coefficient estimate for large firms, is positive and significant according to F-statistics presented at the bottom of Column 5. Consistent with Bhattacharya et al. (2013), this result suggests that poor earnings quality is related to higher information asymmetry for the subsample of large firms. The results from Column 7 and 9 where I use institutional ownership and analyst following respectively to proxy for the information environment generally confirm my earlier findings. In Columns 6, 8 and 10, I use all possible determinants of information asymmetry as control variables for three proxies of the information environment and find similar results. Table 6.6 presents a similar analysis for KZABS earnings quality measure and report qualitatively similar results. The sign of the coefficients on earnings quality and interaction terms is consistent with my prediction developed earlier and the results reported in Table 6.5 for DDSTD earnings quality measure although the magnitude of the coefficients is smaller. The only exception is insignificant coefficient for a subsample of high analyst following firm when the effects of all possible determinants of spread are accounted for. Overall, the results suggest that the association between earnings quality and information asymmetry is affected by the firm's information environment and that the impact of poor earnings quality is more pronounced for smaller firms and those with low institutional ownership and analyst following. This finding contrasts with that of Ajward and Takehara (2011) who find a negative but insignificant relation (without controlling for alternative portfolio style) between absolute abnormal accruals (Kasznik) and the degree of information asymmetry but an unexpected positive and significant relation between accruals quality (Dechow-Dichev) and the degree of information asymmetry, where they use probability of information-based trading as a proxy for information asymmetry. The use of different proxies for information asymmetry, different sample period or different research design may cause the differences in results.

Although previous empirical studies assume a linear relation between information asymmetry and earnings quality, the theoretical studies do not spell out any specific functional form. For this reason, Bhattacharya et al. (2013) implement a non-linear specification considering the possibility that information asymmetry may be low for extremely poor quality earnings because even most informed investors may not produce a precise signal for extremely poor quality earnings which may thwart them from informed trading. The possibility of less

informed trading by informed traders may result in lower information asymmetry among investors, ceteris paribus. Conditional on this dominant effect, Bhattacharya et al. (2013) expect a non-linear (inverted U-shaped) relationship between information asymmetry and earnings quality. In order to test the validity of this argument, I implement the following non-linear specification consistent with Bhattacharya et al. (2013) which includes earnings quality quintile indicator variables in place of the magnitude of earnings quality measures:

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 EQ2_{i,t-1} + \alpha_2 EQ3_{i,t-1} + \alpha_3 EQ4_{i,t-1} + \alpha_4 EQ5_{i,t-1} + \alpha_5 PRICE_{i,t-1} + \alpha_6 VOLUME_{i,t-1} + \alpha_7 VOLATILITY_{i,t-1} + \alpha_8 SIZE_{i,t-1} + \alpha_9 MB_{i,t-1} + \alpha_{10} LEV_{i,t-1} + \alpha_{11} INSTITUTE_{i,t-1} + \alpha_{12} ANALYST_{i,t-1} + \mu_{i,t} \quad \text{Eq. (6.4)}$$

Here, SPREAD represents relative bid-ask spread, the proxy for information asymmetry. EQ(.) represents earnings quality quintile indicator variables (i.e., EQ2 to EQ5) for both measures of earnings quality and all other variables are same as previously defined. I use two-dimensional (year and industry) cluster robust standard errors to calculate *t*-statistics (Gow et al., 2010; Petersen, 2009) which are presented in parentheses.

Table 6.7 presents the results of non-linear specification of the relation between information asymmetry and earnings quality quintile indicator variables after controlling for the effects of determinants of information asymmetry. Column 1 to 5 reports the results for DDSTD earnings quality measure and Column 6 to 10 reports the results for KZABS earnings quality measure. For the purpose of this analysis, I define five indicator variables, EQ1 through EQ5, based on the quintile ranking of each earnings quality groups for both measures. For example, the indicator variable EQ1 takes the value of one for all firms placed in Quintile 1 and zero otherwise, while the indicator variable EQ5 takes the value of one for all firms placed in Quintile 5 and zero otherwise. In non-linear specification, the model intercept captures the spread estimated for the benchmark portfolio with the highest earnings quality (EQ1). From Column 1 and 2, I observe that relative to EQ1, the coefficients on each of the quintile indicator variables (i.e., EQ2 to EQ5) are positive and statistically significant at 1 percent level.[53] It is noteworthy that the coefficients display a monotonic increase in magnitude from EQ2 to EQ5.[54] This

[53] In all specifications, the intercept representing the coefficient of the benchmark quintile is negative because of the use of log transformed value of spread.

[54] I conduct some additional tests, the results of which are stated at the bottom of Table 6.7. I reject the null hypothesis that all of the quintile coefficients are jointly equal to zero (i.e., joint test of EQ2=EQ3=EQ4=EQ5=0) at the 1 percent level. I also reject the null of a joint test that all the coefficients are equal (i.e., joint test of EQ2=EQ3=EQ4=EQ5) at the 1 percent level.

suggests that lower earnings quality is associated with higher information asymmetry, consistent with the inference drawn from the linear specification. Column 3, 4 and 5 show the results of the effect of firm's information environment on the relation between earnings quality and information asymmetry. Same as before I continue to use firm size, institutional ownership, and analyst following as reasonable proxy for firm's information environment. I define a dummy variable (HIED) representing firms with high information environment where HIED takes the value of one for firms above the median value of firm size, institutional ownership and analyst following, respectively, and zero otherwise. I interact this dummy variable with earnings quality quintile indicator variables to examine whether the association between earnings quality and information asymmetry differs between rich and poor information environment firms. From Column 3 to 5, I find that the coefficients of earnings quality quintile indicator variables are positive and statistically significant at 1 percent level. It is important to note that the coefficients increase gradually from EQ2 to EQ5 (relative to EQ1). Moreover, the negative and significant coefficients on the interaction terms suggest that for each of the EQ quintile, the association between earnings quality and information asymmetry is less severe for high information environment firms.[55] I conduct similar analyses for KZABS earnings quality measures for which I create quintile indicator variables based on the magnitude of KZABS. The results reported in Column 6 to 10 for KZABS are materially similar to those for DDSTD except that the coefficient on EQ2 (Column 6 and 7) is not significant at conventional level although the increase in the magnitude of the coefficients relative to EQ1 is monotonic across earnings quality quintiles. Taken as a whole, the results of the non-linear specification are similar to the results of the linear specification suggesting that poor earnings quality is associated with higher information asymmetry and the adverse consequences of poor earnings quality on information asymmetry depend on the information environment of the firms.

[55] Unreported result shows that the coefficients of earnings quality for high information environment firms are significantly positive (at least at 10 percent level) only for quintiles EQ4 and EQ5.

Table 6.7: Regression of Quoted Bid-Ask Spread on Earnings Quality Quintile Indicator Variables and Several Control Variables Shown to be Associated with Spread (Non-Linear Specification)

This table reports estimation of Eq. (6.4)

$$SPREAD_{i,t} = \alpha_0 + \alpha_1 EQ2_{i,t-1} + \alpha_2 EQ3_{i,t-1} + \alpha_3 EQ4_{i,t-1} + \alpha_4 EQ5_{i,t-1} + \alpha_5 PRICE_{i,t-1} + \alpha_6 VOLUME_{i,t-1} + \alpha_7 VOLATILITY_{i,t-1} + \alpha_8 SIZE_{i,t-1} + \alpha_9 MB_{i,t-1} + \alpha_{10} LEV_{i,t-1} + \alpha_{11} INSTITUTE_{i,t-1} + \alpha_{12} ANALYST_{i,t-1} + \mu_{i,t} \quad \text{Eq. (6.4)}$$

where SPREAD represents relative bid-ask spread. EQ(.) represents earnings quality quintile indicator variables (i.e., EQ2 to EQ5) for DDSTD and KZABS earnings quality measures. I define five indicator variables, EQ1 through EQ5, based on the quintile ranking of each earnings quality groups for both measures. For example, the indicator variable EQ1 takes the value of one for all firms placed in Quintile 1 and zero otherwise, while the indicator variable EQ5 takes the value of one for all firms placed in Quintile 5 and zero otherwise. Column 1 to 5 reports the results for DDSTD earnings quality measure and Column 6 to 10 reports the results for KZABS earnings quality measure. Column 1, 2, 6 and 7 of this table reports the regression coefficients of spread on earnings quality quintile indicator variables and control variables. Column 3-5 and 8-10 presents the results of the effect of information environment on the association between earnings quality and information asymmetry where I interact quintile indicator variables with a dummy variable (HIED) representing firms with high information environment. HIED takes the value of one for firms above the median value of firm size, institutional ownership and analyst following, respectively, and zero otherwise. The expected sign for each coefficient is indicated adjacent to the variable name. All other variables are defined in Appendix C. The sample period and the number of observation vary across Columns depending on particular variables used in the regression. All continuous variables are winsorized at the bottom and top 1% levels of their respective distribution. t-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al. 2010; Petersen 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Variable	Expected Sign	EQ=DDSTD					EQ=KZABS				
				Firm Size	Institutional Ownership	Analyst Following			Firm Size	Institutional Ownership	Analyst Following
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
EQ2		0.055*** (5.59)	0.058*** (5.95)	0.258*** (5.77)	0.182*** (4.37)	0.124*** (4.66)	0.020 (1.08)	0.014 (0.68)	0.202*** (3.60)	0.148*** (2.82)	0.100*** (4.39)
EQ2*HIED	(-)			-0.269*** (-5.47)	-0.184*** (-3.70)	-0.124*** (-2.74)			-0.260*** (-3.98)	-0.204*** (-3.59)	-0.171*** (-5.63)
EQ3		0.113*** (5.39)	0.090*** (3.50)	0.330*** (5.94)	0.270*** (6.22)	0.165*** (6.33)	0.064*** (3.62)	0.061*** (2.97)	0.240*** (6.57)	0.196*** (5.03)	0.154*** (5.10)
EQ3*HIED	(-)			-0.298*** (-4.50)	-0.235*** (-4.72)	-0.140*** (-3.32)			-0.257*** (-5.46)	-0.214*** (-4.14)	-0.189*** (-4.73)
EQ4		0.182*** (7.89)	0.167*** (6.73)	0.385*** (7.44)	0.327*** (6.95)	0.272*** (6.65)	0.149*** (7.21)	0.107*** (4.21)	0.342*** (7.54)	0.284*** (5.88)	0.210*** (5.54)
EQ4*HIED	(-)			-0.286*** (-4.81)	-0.225*** (-3.89)	-0.199*** (-3.41)			-0.285*** (-5.34)	-0.230*** (-3.88)	-0.209*** (-5.60)
EQ5		0.398*** (8.03)	0.307*** (6.36)	0.588*** (7.10)	0.569*** (7.15)	0.428*** (7.93)	0.307*** (7.66)	0.224*** (5.11)	0.498*** (8.06)	0.429*** (7.82)	0.327*** (4.87)

EQ5*HIED	(-)			-0.287*** (-3.49)	-0.308*** (-3.60)	-0.256*** (-3.57)			-0.302*** (-4.19)	-0.258*** (-3.96)	-0.221*** (-2.70)
PRICE	(-)	-0.276*** (-7.94)	-0.214*** (-5.62)	-0.273*** (-7.82)	-0.253*** (-7.56)	-0.212*** (-5.71)	-0.280*** (-8.23)	-0.211*** (-5.73)	-0.277*** (-8.08)	-0.251*** (-7.20)	-0.207*** (-5.71)
VOLUME	(-)	-0.237*** (-9.15)	-0.197*** (-6.87)	-0.233*** (-8.85)	-0.211*** (-8.52)	-0.194*** (-6.62)	-0.243*** (-9.38)	-0.193*** (-7.24)	-0.239*** (-9.07)	-0.211*** (-8.24)	-0.188*** (-6.81)
VOLATILITY	(+)	0.224*** (3.33)	0.142* (1.69)	0.219*** (3.24)	0.190*** (2.61)	0.138* (1.67)	0.242*** (3.73)	0.146* (1.81)	0.235*** (3.61)	0.204*** (2.89)	0.143* (1.80)
SIZE	(-)	-0.038 (-0.90)	-0.075** (-1.99)	0.003 (0.09)	-0.050 (-1.41)	-0.073* (-1.90)	-0.030 (-0.72)	-0.082** (-2.25)	0.010 (0.24)	-0.052 (-1.46)	-0.082** (-2.21)
MB	(+)	0.063* (1.74)	0.086* (1.72)	0.064* (1.80)	0.057 (1.41)	0.089* (1.81)	0.064 (1.63)	0.093* (1.79)	0.065* (1.67)	0.063 (1.47)	0.097* (1.83)
LEV	(+/-)	0.012*** (3.33)	0.016*** (3.98)	0.010*** (2.64)	0.010*** (3.08)	0.016*** (4.36)	0.012*** (3.41)	0.015*** (4.12)	0.009** (2.75)	0.010*** (3.22)	0.016*** (4.61)
INSTITUTE	(+/-)		-0.003** (-2.27)		0.001 (1.03)	-0.002* (-1.97)		-0.003** (-2.40)		0.000 (0.61)	-0.003** (-2.26)
ANALYST	(+/-)		0.023*** (7.27)			0.031*** (10.72)		0.024*** (7.58)			0.034*** (12.68)
Intercept		-2.625*** (-8.33)	-2.821*** (-8.63)	-3.108*** (-9.94)	-2.731*** (-9.15)	-2.925*** (-9.02)	-2.634*** (-8.57)	-2.731*** (-8.42)	-3.084*** (-10.29)	-2.670*** (-9.75)	-2.831*** (-8.81)
N		10,425	5,043	10,425	8,631	5,043	10,425	5,043	10,425	8,631	5,043
Adjusted R^2		70.05%	50.13%	71.24%	69.28%	51.03%	70.25%	49.87%	71.36%	69.31%	50.87%
F-stat (p value) H_0: EQ2=EQ3=EQ4=EQ5=0 H_1:EQ2=EQ3=EQ4=EQ5≠0		35.89*** (0.000)	13.82*** (0.000)	25.00*** (0.000)	16.21*** (0.000)	17.09*** (0.000)	33.14*** (0.000)	10.37*** (0.000)	27.96*** (0.000)	47.53*** (0.000)	11.68*** (0.000)
F-stat (p value) H_0: EQ2=EQ3=EQ4=EQ5 H_1: EQ2≠EQ3≠EQ4≠EQ5		29.40*** (0.000)	17.09*** (0.000)	24.41*** (0.000)	17.09*** (0.000)	15.35*** (0.000)	43.22*** (0.000)	15.34*** (0.000)	31.80*** (0.000	60.41*** (0.000)	8.13*** (0.000)

6.5.3 Regression Analysis of Information Asymmetry on Two Distinct Components of Earnings Quality

To decompose earnings quality into an innate component and a discretionary component, I follow the approach outlined in Francis et al. (2005). According to this approach, I regress a measure of earnings quality on innate factors that prior researchers believe describe the firm's business model and its operating environment. For example, Francis et al. (2005) implement this approach using DD model of earnings quality and innate factors. For this purpose, I use the five innate factors considered by Dechow and Dichev (2002) as explaining accrual quality such as firm size (ASSET), cash flow variability (VCFO), sales variability (VSALES), length of operating cycle (OPCYCLE), and incidence of negative earnings realizations (NEG). Dechow and Dichev (2002) posit and find that accrual quality is inversely associated with firm size, and positively associated with cash flow variability, sales variability, operating cycle and incidence of losses. Building on Dechow-Dichev (2002), Francis et al. (2004) use measures of intangible intensity (INTAN), intangible dummy (INTANDUM) and capital intensity (CAPITAL) as additional factors capturing business model. I also include these three factors. Finally, I estimate the following equation annually to estimate the components of earnings quality:

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \quad \text{Eq. (6.5)}$$

where, the predicted values from equation (6.5) yield an estimate of the innate portion of firm *i*'s earnings quality in year *t*, and the residual from equation (6.5) is the estimate of the discretionary component of firm *i*'s earnings quality. This approach yields distinct estimates for each of the two components of earnings quality.[56]

Table 6.8 presents the results of the regression of spread on two components of both measures of earnings quality - innate component and discretionary component - entered into regression model both individually and jointly. The inclusion of innate and discretionary components in the regression model together enables me to assess the differential impact of each component. Column 1 to 5 reports results for DDSTD and Column 6 to 10 reports results for KZABS earnings quality measures. I examine both linear and non-linear specification of the

[56] In unreported test, I use second approach of Francis et al. (2005) in which I include all the innate factors as right hand side variables with earnings quality and other control variables. The coefficients of earnings quality of this regression is interpreted as capturing the effect of discretionary earnings quality on information asymmetry. Comparing this coefficient with that of total earnings quality from Table 6.5 and 6.6 indicate that innate component has larger impact than discretionary component.

relation between information asymmetry and individual component of earnings quality for both measures. In linear specification, I use magnitude of innate and discretionary component of earnings quality measures while in non-linear specification, I keep on using quintile indicator variables for each component of earnings quality. In all of these specifications, I use PRICE, VOLUME, VOLATILITY, SIZE, MB and LEV as control variables.[57]

For DDSTD earnings quality measure, the innate component shows significantly positive coefficient in the linear specification reported in Column 1. In the non-linear specification reported in Column 2, the model intercept captures the spread estimated for the benchmark group with the highest innate component of earnings quality (InnateEQ1). The result shows that the coefficient on InnateEQ2 is negative but insignificant relative to InnateEQ1 suggesting an insignificant decrease in spread relative to benchmark group. After that, the coefficient increases gradually from InnateEQ3 to InnateEQ5 indicating a higher level of information asymmetry in firms characterized by turbulent and uncertain operating environments. The effect of innate component of earnings quality on the spread is more evident in quintiles with relatively low innate earnings quality compared to quintiles with relatively high innate earnings quality because the coefficients on InnateEQ4 and InnateEQ5 are significantly positive but the coefficient on InnateEQ3 is positive but not significant. Column 3 and 4 report the results of discretionary component of earnings quality for linear and non-linear specification respectively. Since earnings quality measures are estimated using industry-level regressions and defined in such a way that lower value denotes higher earnings quality, I expect that negative discretionary accruals will ameliorate earnings quality, and positive discretionary accruals will deteriorate earnings quality relative to other firms in the same industry. The result demonstrates that the coefficient on discretionary component of earnings quality is positive and statistically significant at the 1 percent level in the linear specification. The result for the non-linear specification of discretionary component exhibits analogous pattern consistent with its innate component counterpart. Specifically, the negative coefficient on DiscEQ2 and positive coefficient on DiscEQ3 are insignificant relative to DiscEQ1, the benchmark portfolio with the highest

[57] I do not control for the effect of institutional ownership (INSTOWN) and analyst following (ANALYST) in order to avoid the sample size being drastically small. In unreported result, I find that controlling for the effect of institutional ownership does not cause any material change in the reported results. However, taking into account the effect of analyst following changes the significance level of some coefficients but the basic tenor of the results remains unaffected. One reason for this might be multicollinearity problem induced by very high correlation among analyst following, size and volume. As a test of this intuition, if I keep only analyst following and drop size and volume from the model, I find that the original results hold.

discretionary component of earnings quality, while the coefficients on DiscEQ4 and DiscEQ5 are positive and significant at the 1 percent level. This evidence suggests that spread doesn't fluctuate significantly among comparatively high discretionary earnings quality quintiles, which essentially contain negative discretionary accruals quality and spread is significantly higher in relatively low discretionary earnings quality quintiles consisting of positive discretionary accruals quality. Thus, it appears that investors do not react uniformly to negative and positive discretionary accruals quality.[58] The result of non-linear specification indicates that the evidence from linear specification should be interpreted with caution for both components of earnings quality because non-linear specification implies that the empirical relation between information asymmetry and two distinct components of earnings quality may not be linear. In Column 5, I include innate and discretionary components together and find that both are significantly positively associated with the spread. However, the F-statistic reported in the bottom of Column 5 suggests that the effect of innate and discretionary component on information asymmetry is not significantly different.

The results for KZABS earnings quality measures (presented in Column 6 to 10) imitate my earlier results for DDSTD earnings quality measures. In the linear specifications (Column 6 and 8 respectively), the coefficient on innate and discretionary earnings quality is significantly positive. In the non-linear specification (Column 7 and 9 respectively), I find that the effect of innate and discretionary earnings quality is more pronounced in quintiles representing firms with poor earnings quality. When I include innate and discretionary components together in the regression model (Column 10), I find that both are positive and significant, but innate component has marginally larger impact on information asymmetry than discretionary component since F-test of no difference in the coefficients of innate and discretionary component rejects the null at 10 percent level.

[58] As an additional test to validate this pattern of relationship between the two constructs, I examine separately the impact of positive and negative discretionary accruals quality on information asymmetry. In untabulated result, I find that the coefficient on negative discretionary accruals quality is positive but insignificant suggesting no significant impact on information asymmetry. On the other hand, the coefficient on positive discretionary accruals quality is significantly positive suggestive of higher level of information asymmetry. This finding contrasts with Bhattacharya et al. (2013) who find that both extreme positive discretionary accruals quality and extreme negative discretionary accruals quality are associated with higher information asymmetry resulting into a U-shaped association between discretionary accruals quality and information asymmetry. They interpret this evidence as indicative of managers discretionary reporting choices that cause large deviation in the mapping of accruals into cash flows can baffle investors and increase information asymmetry.

Table 6.8: Regression of Quoted Bid-Ask Spread on Earnings Quality Components and Several Control Variables Shown to be Associated with Spread

This table presents the results of the regression of relative spread on two components of both measures of earnings quality - innate component and discretionary component - entered the regression model both individually and jointly. InnateEQ is the fitted value from Eq. (6.5) and DiscEQ is the residual from Eq. (6.5):

$$EQ_{i,t} = \gamma_0 + \gamma_1 ASSET_{i,t} + \gamma_2 VCFO_{i,t} + \gamma_3 VSALES_{i,t} + \gamma_4 OPCYCLE_{i,t} + \gamma_5 NEG_{i,t} + \gamma_6 INTAN_{i,t} + \gamma_7 INTANDUM_{i,t} + \gamma_8 CAPITAL_{i,t} + \mu_{i,t} \qquad \text{Eq. (6.5)}$$

where EQ is a measure of inverse earnings quality calculated from the modified Dechow and Dichev (2002) model and Kasznik version of modified Jones (1991) model. InnateEQ and DiscEQ are inverse measures of innate and discretionary earnings quality respectively. Column 1 to 5 report results for DDSTD and Column 6 to 10 report results for KZABS earnings quality measures. I examine both linear (Column 1, 3, 5, 6, 8, 10) and non-linear (Column 2, 4, 7, 9) specification of the relation between information asymmetry and individual component of earnings quality for both measures. In linear specification, I use magnitude of innate and discretionary component of earnings quality measures while in non-linear specification, I use quintile indicator variables for each component of earnings quality. All other variables are defined in Appendix C. The expected sign for each coefficient is indicated adjacent to the variable name. The sample period is 2002-2012 and consists of 10,425 observations for all models. All continuous variables are winsorized at the bottom and top 1% levels of their respective distribution. t-statistics are calculated based on two-way (year and industry) clustered robust standard errors (Gow et al., 2010; Petersen, 2009) and presented in parentheses. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively.

Variable	Expected Sign	EQ=DDSTD					EQ=KZABS				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
InnateEQ	(+)	12.327*** (4.56)				12.374*** (4.64)	10.050*** (3.27)				9.153*** (3.02)
DiscEQ	(+)			8.723*** (5.94)		8.747*** (6.21)			4.417*** (6.70)		4.192*** (6.97)
InnateEQ2			-0.007 (-0.20)					-0.018 (-0.55)			
InnateEQ3			0.072 (1.50)					0.049 (1.11)			
InnateEQ4			0.133*** (3.01)					0.115*** (2.94)			
InnateEQ5			0.315*** (5.17)					0.265*** (4.79)			
DiscEQ2					-0.026 (-1.14)					-0.006 (-0.53)	
DiscEQ3					0.022 (0.70)					0.022 (1.58)	
DiscEQ4					0.082*** (2.61)					0.089*** (6.34)	

DiscEQ5					0.249*** (5.23)					0.231*** (6.31)	
PRICE	(-)	-0.259*** (-7.84)	-0.254*** (-7.67)	-0.259*** (-7.58)	-0.253*** (-7.52)	-0.294*** (-8.49)	-0.263*** (-7.68)	-0.265*** (4.79)	-0.274*** (-8.00)	-0.268*** (-7.97)	-0.292*** (-8.16)
VOLUME	(-)	-0.217*** (-8.74)	-0.217*** (-8.84)	-0.224*** (-8.71)	-0.217*** (-8.69)	-0.252*** (-9.41)	-0.222*** (-8.79)	-0.228*** (-9.49)	-0.240*** (-9.07)	-0.234*** (-9.12)	-0.249*** (-9.02)
VOLATILITY	(+)	0.187*** (2.94)	0.190*** (3.06)	0.234*** (3.24)	0.220*** (3.19)	0.230*** (3.20)	0.188*** (3.06)	0.206*** (3.41)	0.249*** (3.64)	0.240*** (3.62)	0.225*** (3.32)
SIZE	(-)	-0.055 (-1.30)	-0.058 (-1.41)	-0.076* (-1.86)	-0.084** (-2.14)	-0.006 (-0.13)	-0.046 (-0.98)	-0.037 (-0.95)	-0.044 (-1.01)	-0.052 (-1.25)	-0.010 (-0.19)
MB	(+)	0.070** (2.01)	0.063* (1.94)	0.077** (2.05)	0.079** (2.18)	0.059 (1.54)	0.060 (1.56)	0.051 (1.46)	0.072* (1.78)	0.071* (1.80)	0.061 (1.45)
LEV	(+/-)	0.012*** (2.97)	0.011*** (2.79)	0.010*** (2.73)	0.010*** (2.76)	0.013*** (3.46)	0.013*** (3.41)	0.013*** (3.34)	0.010*** (3.00)	0.010 (2.89)	0.014*** (3.67)
Intercept		-2.727*** (-7.80)	-2.535*** (-7.88)	-2.226*** (-7.41)	-2.248*** (-7.63)	-2.969*** (-8.31)	-2.766*** (-6.98)	-2.637*** (-8.99)	-2.440*** (-7.87)	-2.467*** (-7.99)	-2.906*** (-7.03)
N		10,425	10,425	10,425	10,425	10,425	10,425	10,425	10,425	10,425	10,425
Adjusted R^2		69.04%	69.27%	69.44%	69.23%	70.49%	69.51%	69.77%	70.03%	69.77%	70.66%
F-stat (p value) H_0: InnateEQ = DiscEQ H_1: InnateEQ ≠ DiscEQ						1.23 (0.269)					2.99* (0.086)

The empirical evidence presented so far implies that poor earnings quality is significantly associated with higher level of information asymmetry as manifested in bid-ask spread after controlling for the determinants of spread. The adverse impact of poor earnings quality is affected by the firm's information environment and is more pronounced for firms operating in poor disclosure environment. Since earnings quality is affected not only by managers' discretionary reporting choices but also by firms' economic environment and business model, I partition the earnings quality measures into an innate component and a discretionary component in order to assess the impact of each component on information asymmetry. The result shows that both innate and discretionary components of earnings quality have a significant impact on information asymmetry. The impact of innate earnings quality on information asymmetry is marginally higher than discretionary component for KZABS earnings quality measure.

6.5.4 Robustness Tests

In this section, I examine and report whether my initial results are robust to new estimation period for spread, other proxies of information asymmetry, different variable specification for earnings quality measures and alternative estimation procedure.

6.5.4.1 Non-announcement Period Spread

Many prior studies have investigated the behavior of information asymmetry surrounding an information event, mainly quarterly or annual earnings announcement. For example, Otogawa (2003) investigates the changes in information asymmetry around quarterly earnings announcement for a sample of firms listed on TSE. Some studies have shifted the focus from changes in information asymmetry around earnings announcement to non-announcement period information asymmetry measured by bid-ask spread (Welker, 1995) or price impact of trade (Bhattacharya et al., 2013). Instead, I examine and report how the quality of reported earnings affects the average level of information asymmetry throughout a year including both announcement and non-announcement period as the main results of the study. I measure average level of information asymmetry over a year by taking the average of daily relative bid-ask spread in a year. Since there is evidence of temporal variation in spread during different time periods of a year, taking average of daily spread neutralizes this temporal oscillation in spread. Therefore, I check the robustness of the main result by examining the relationship between earnings quality and information asymmetry in the non-announcement period.

According to the requirement of the stock exchanges, Japanese firms have to announce a summary of important items like annual earnings and dividends within 45 days and publish annual reports containing audited financial statements within 90 days from the end of a fiscal year. It is found that almost 80% of the Japanese firms announce their annual earnings within 45 days, and all firms announce annual earnings and publish financial statements within 90 days. Japanese quarterly reporting system requires all listed firms disclose quarterly earnings reports along with other important items soon after the end of a quarter. Prior research finds that approximately 80% of the listed firms announce their quarterly earnings from 30 days to 45 days from the end of a quarter. Accordingly, I define non-announcement period as 30 days period starting from 91 days from the end of fiscal year and ending on 15 days prior to the end of quarterly earnings announcement period and estimate information asymmetry for the non-announcement period as the average of daily relative bid-ask spread for this 30 days period. It can be observed from Figure 6.1 that the non-announcement period corresponds to the most immediate period after the publication of annual financial statement when investors can measure earnings quality precisely. So any effect of earnings quality on information asymmetry is likely to be more evident in this period.

Figure 6.1: Non-announcement period for a typical Japanese firm having March fiscal year end.

Fiscal year end	Announcement of summary items like earnings and dividends	Publication of annual financial statements / End of first quarter	Non-earnings announcement period	Quarterly earnings announcement period
March 31	May 15	June 30	July 1 - July 30	August 1 to 15
Fiscal year end (0 days)	45 days from the end of fiscal year	90 days from the end of fiscal year First quarter end (0 days)	30 days period	30 - 45 days from the end of first quarter

Panel A of Table 6.9 presents the result of this robustness check for both measures of earnings quality. Column 1 to 5 reports results for DDSTD and Column 6 to 10 reports results for KZABS earnings quality measure. The results (reported in Column 1, 2, 6 and 7) show that

the coefficient on earnings quality is positive and significant suggesting that lower quality earnings increases information asymmetry in the market. I also test whether the impact of poor earnings quality differs between firms with rich information environment and firms with poor information environment. I use firm size, institutional ownership, and analyst following to proxy for firm's information environment and define high information environment dummy as before. The results (shown in Column 3, 4, 5, 8, 9 and 10) show that the coefficient of the interaction term between earnings quality and high information environment dummy is negative and significant (except coefficient in Column 3) implying that poor earnings quality has more pronounced effect on low information environment firms than high information environment firms.

6.5.4.2 Amihud (2002) Illiquidity Measure

Prior research has used different measures of market illiquidity as empirical proxies for unobservable information asymmetry such as quoted or effective bid-ask spread, transaction price impact of trade or the probability of information-based trading. One difficulty is that these measures require detailed and finer market-microstructure data that are not readily available in many stock markets. To overcome the paucity of data, Amihud (2002) developed a new measure of illiquidity that require only periodic stock return and volume data that can be easily obtained for many stocks and for a longer time-period. In order to confirm the robustness of my result to the alternative measures of information asymmetry, I use Amihud (2002) measure of illiquidity, which is defined as the ratio of a stock absolute daily return to its daily yen volume, averaged over a year.

The intuition behind Amihud's illiquidity measure is as follows. Liquidity is generally defined as the ability to trade large volume of securities quickly, at a low cost of transaction, and without much price fluctuations. If this characterization of liquidity holds, a stock is deemed to be liquid if its price changes are largely unaffected by the number of shares traded. Amihud's illiquidity measure, computed as the ratio of daily absolute returns to daily yen trading volume, attempts to capture an aspect of illiquidity associated with temporary price movement induced by trade volume. This measure is also interpreted as a rough measure of the price impact of trade. According to this measure, a stock is considered illiquid if its price moves a lot in response to a

little change in volume. Thus, higher value of this measure indicates greater price movement driven by trading volume and more illiquid stocks.

Following Amihud (2002), I compute the daily price impact of trade as |Return|/(Price×Volume), where Return is the daily stock return, Price is the daily closing price of the stock and Volume is the daily trading volume. For ease of exposition, I multiply the derived value by 100000 and take its log-transformed value. I also control for the effect of the same set of factors as used for the spread. The results of the relation between Amihud (2002) measure of illiquidity and two earnings quality proxies are presented in Panel B of Table 6.9. I find that the result (Column 1, 2, 6 and 7) is consistent with the idea that poor earnings quality is significantly associated with higher level of illiquidity as reflected in positive coefficients. I also find that firm's information environment significantly affects the relationship between earnings quality and market illiquidity as demonstrated in the negative coefficients on the interaction term (Column 3, 4, 5, 8, 9 and 10).

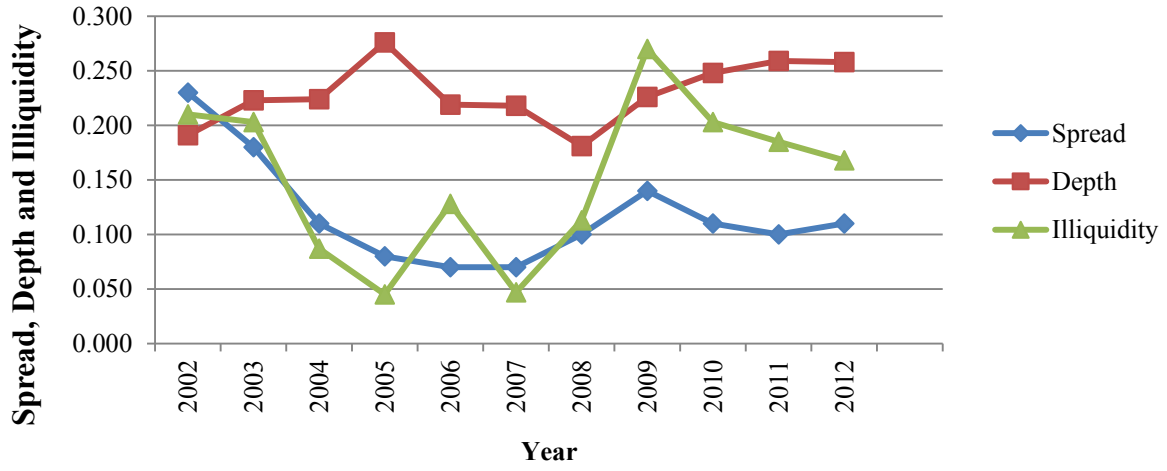
6.5.4.3 Quoted Depth

Quoted depth, another important component of market liquidity, is highly related to quoted bid-ask spread. Lee et al. (1993) contend that market makers protect themselves from the risk of trading with informed investors not only by widening the quoted bid-ask spread but also by narrowing the quoted depths associated with quoted prices. If poor earnings quality increases the possibility that some traders will acquire and trade on private information, the argument put forward by Lee et al. (1993) suggests that firms with poorer earnings quality will have higher spread and lower depth causing spread and depth move in opposite direction. This type of model expects quoted depths to be the "mirror image" of spreads. In contrast to this simple intuitive notion, drawing upon the argument in Diamond and Verrecchia (1991) that better disclosures can reduce the reward to market making, motivating some liquidity providers to withdraw their services, and empirical evidence that quoted depth declines as market making reward falls, Heflin et al. (2005) uncover a negative relation between analysts' ratings of firms' disclosures and quoted depth. Therefore, I also focus on the quoted depth to test the robustness of my main result since one cannot draw unambiguous inference about the relation between earnings quality and information asymmetry relying solely on bid-ask spread. I define quoted depth as the sum of daily quoted depth at closing bid and ask price divided by the number of shares outstanding each

day, averaged over a year. To be consistent with spread measure calculation, I require at least 150 days quoted depth data, and I transform this measure into logarithmic form.

Figure 6.2 shows the average relative spread (multiplied by 10), quoted depth and Amihud (2002) illiquidity for the sample firms over the period 2002-2012. It can be observed from the figure that average spread and depth move in opposite direction. Specifically average spread tends to decline in the initial periods of my sample while average depth shows a rising trend. When average spread starts to rise in 2008-2009 period and slips down afterward, average depth falls in 2008 and climbs up gradually thereafter. This pattern of behavior of average spread and average depth is a clear indication of market participants simultaneously manipulating both quoted spread and quoted depth in order to get rid of the risk of asymmetric information. Like average spread, average Amihud (2002) illiquidity measure demonstrates analogous pattern of movement over time. Therefore, I expect a positive relation between depth and earnings quality. Since prior research doesn't prescribe specific factors that might affect depth, and as it is unclear how depth varies across firm or over time due to the dearth of studies on depth, I continue to use the same set of control variables for depth measure like bid-ask spread.

Figure 6.2: Average relative bid-ask spread, depth and illiquidity over time



The results of the association between depth measure and two proxies of earnings quality are reported in Panel C of Table 6.9. The result (Column 1, 2, 6 and 7) shows that the coefficient on earnings quality is negative and significant, implying that quoted depth falls as earnings

quality deteriorates, consistent with the arguments in Lee et al. (1993). When I include an interaction term between earnings quality and high information environment dummy (Column 3, 4, 5, 8, 9 and 10) aiming at exploring the impact of a firm's information environment on the expected relationship between depth and earnings quality, I find that the coefficient on the interaction term is significantly negative. This finding suggests that the magnitude of the relation between depth and earnings quality differs significantly between high and low information environment firms. However, the coefficient on earnings quality is negative but not significant for all proxies of information environment (the coefficient is significant only when analyst following is used as a proxy for firm's information environment). This result should be interpreted with caution because if I use unorthogonalized volume in place of orthogonalized volume as a control variable, the coefficient on earnings quality turns out to be positive complicating the relationship between quoted depth and earnings quality. Hence, I recognize that the use of depth as a proxy for information asymmetry may produce ambiguous inference, thereby, requiring further research to resolve this discrepancy.

6.5.4.4 Alternative Variable Specification for Earnings Quality Measure

In the main analysis part of my study, I use raw values of earnings quality such as standard deviation of residuals for DDSTD and absolute value of residuals for KZABS measure. With respect to the variable specification, I repeat my test replacing the raw values of earnings quality measures with the quintile rank values of earnings quality measures. The lowest rank denotes highest quality earnings and vice-versa. The use of quintile ranks is suggested to control for outliers and non-linearities. The results of the quintile rank values regressions (reported in Panel D of Table 6.9) suggest that this respective set of analyses produce results substantively the same as those reported earlier. Specifically, firms with poor earnings quality experience higher information asymmetry and this relationship is less manifested in high information environment firms.

6.5.4.5 Fama-MacBeth (1973) Estimation Procedure

In the main analysis, I estimate the coefficients of the regression using OLS but adjust the standard errors for possible correlation within a cluster. I report two-dimensional (industry and year) clustered-robust standard errors for drawing inferences as recommended by Gow et al. (2010). The selection of a correct estimation method hinges on the form of

dependence in the residuals which cannot be known precisely very often. Therefore, estimating the coefficients and standard errors using multiple methods can be an effective robustness check of my original results. In a survey of recently published finance paper, Petersen (2009) finds that a large number of papers (34 percent of the papers that reported adjusting the standard errors for possible dependence in the residuals) estimated both the coefficients and the standard errors using the Fama-MacBeth (1973) procedure, a method commonly used by the researchers. Moreover, he concludes that clustering standard errors on multiple dimensions appears unnecessary in empirical finance applications he examined. So, I reestimate the coefficients and the standard errors according to Fama-MacBeth procedure to check the sensitivity of the results to alternative estimation methodology. In this approach, I run annual cross-sectional regression and report the mean of yearly coefficients. The t-statistics are calculated based on the time-series standard errors of the estimated coefficients. This alternative methodology yields substantially similar results (reported in Panel E of Table 6.9) supporting my primary hypothesis that earnings quality is inversely related to the level of information asymmetry. The results also show the impact of earnings quality on information asymmetry is less pronounced for firms operating in high information environment. I also estimate standard errors clustered only by firm or by year or both by firm and year and come to similar conclusions (results not reported).

Table 6.9: Robustness Tests

This table presents the results for non-announcement period spread in Panel A, for Amihud (2002) illiquidity measure in Panel B, for quoted depth measure in Panel C, for quintile rank values of earnings quality in Panel D, and for Fama-MacBeth regression in Panel E. Column 1 to 5 reports the results for DDSTD earnings quality measure and Column 6 to 10 reports the results for KZABS earnings quality measure. Column 1, 2, 6 and 7 of this table reports the coefficients from the regression of different proxies of information asymmetry on earnings quality variables and several control variables. Column 3-5 and 8-10 presents the results of the effect of information environment on the association between earnings quality and information asymmetry where I interact earnings quality variables with a dummy variable (HIED) representing firms with high information environment. HIED takes the value of one for firms above the median value of firm size, institutional ownership and analyst following, respectively, and zero otherwise. The expected sign for each coefficient is indicated adjacent to the variable name. The sample period and the number of observation vary across Columns depending on particular variables used in the regression. All continuous variables are winsorized at the bottom and top 1% levels of their respective distribution. The values in the parentheses indicate t-statistics calculated using appropriate method. For Panel A to D, I use two-way (year and industry) clustered robust standard errors while for Panel E, I use time-series standard errors of annual coefficients in order to calculate t-statistics. ***, **, and * indicate statistical significance at the .01, .05, and .10 level, respectively. I include the same set of control variables as before but do not report the coefficients due to the limitation of space.

Variable	**Expected Sign**	**EQ=DDSTD**					**EQ=KZABS**				
				Firm Size	Institutional Ownership	Analyst Following			Firm Size	Institutional Ownership	Analyst Following
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Non-announcement Period Spread											
EQ	(+)	14.245*** (7.91)	15.733*** (2.70)	15.786*** (8.01)	18.061*** (5.63)	17.920*** (3.83)	6.120*** (5.82)	6.654*** (2.76)	7.902*** (5.99)	8.537*** (5.63)	8.395*** (4.42)
EQ*HIED	(-)			-3.076 (-0.87)	-6.209*** (-5.06)	-5.112* (-1.89)			-3.299*** (-2.72)	-4.121*** (-4.42)	-3.708*** (-2.74)
Control Variables		Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
N		10,347	5,008	10,347	8,578	5,008	10,347	5,008	10,347	8,578	5,008
Adjusted R^2		36.30%	21.68%	36.73%	34.14%	21.84%	36.18%	21.45%	36.34%	33.88%	21.64%
Panel B: Amihud (2002) Illiquidity											
EQ	(+)	11.654*** (4.75)	10.211*** (3.45)	14.268*** (5.77)	13.655*** (6.32)	12.510*** (4.29)	6.633*** (6.31)	6.023*** (4.04)	7.990*** (8.54)	7.625*** (7.57)	7.228*** (5.93)
EQ*HIED	(-)			-6.866*** (-6.30)	-3.500*** (-2.79)	-6.539** (-2.50)			-3.463*** (-3.98)	-1.869*** (-2.66)	-3.188** (-2.47)
Control Variables		Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
N		15,062	5,923	15,062	12,422	5,923	15,062	5,923	15,062	12,422	5,923
Adjusted R^2		92.52%	91.88%	92.59%	92.95%	91.94%	92.54%	91.84%	92.58%	92.95%	91.87%

Panel C: Quoted Depth											
EQ	(-)	-2.737** (-2.07)	-7.387*** (-3.35)	-0.692 (-0.46)	-1.083 (-0.71)	-5.848** (-2.24)	-2.000*** (-3.41)	-4.263*** (-4.66)	-0.233 (-0.28)	-0.584 (-0.84)	-2.946*** (-3.23)
EQ*HIED	(+)			-4.071*** (-3.01)	-5.515*** (-5.33)	-3.620** (-2.09)			-3.281*** (-3.75)	-3.544*** (-4.86)	-2.817*** (-2.64)
Control Variables		Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
N		10,425	5,043	10,425	8,631	5,043	10,425	5,043	10,425	8,631	5,043
Adjusted R^2		51.13%	39.70%	51.42%	51.09%	39.89%	51.01%	39.75%	51.44%	50.94%	40.01%
Panel D: Quintile Rank of Earnings Quality											
EQ	(+)	0.088*** (8.70)	0.067*** (6.93)	0.138*** (8.19)	0.127*** (8.20)	0.096*** (8.14)	0.071*** (8.00)	0.051*** (5.04)	0.122*** (8.86)	0.105*** (8.34)	0.078*** (5.56)
EQ*HIED	(-)			-0.082*** (-5.09)	-0.074*** (-4.75)	-0.060*** (-4.57)			-0.081*** (-5.63)	-0.068*** (-4.97)	-0.057*** (-4.40)
Control Variables		Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
N		10,425	5,043	10,425	8,631	5,043	10,425	5,043	10,425	8,631	5,043
Adjusted R^2		69.77%	49.96%	71.11%	69.22%	51.08%	70.04%	49.71	71.32%	69.27%	50.76%
Panel E: Alternative Estimation Procedure (Fama-MacBeth Regression)											
EQ	(+)	11.649*** (13.26)	10.729*** (8.32)	14.671*** (15.67)	15.082*** (15.23)	12.769*** (9.86)	5.582*** (15.46)	4.776*** (10.62)	7.890*** (15.94)	7.891*** (14.35)	6.203*** (10.42)
EQ*HIED	(-)			-6.148*** (-11.48)	-6.256* (-8.85)	-4.849*** (-6.72)			-4.247*** (-12.62)	-3.930*** (-9.19)	-2.992*** (-4.31)
Control Variables		Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
No. of years		11	9	11	9	9	11	9	11	9	9
Average Adjusted R^2		69.84%	46.54%	70.64%	68.15%	47.69%	69.81%	46.47%	70.43%	67.73%	47.34%

Column 1, 3, 6 and 8 include PRICE, VOLUME, VOLATILITY, SIZE, MB and LEV as control variables.

Column 4 and 9 include PRICE, VOLUME, VOLATILITY, SIZE, MB, LEV and INSTITUTE as control variables.

Column 2, 5, 7 and 10 include PRICE, VOLUME, VOLATILITY, SIZE, MB, LEV, INSTITUTE and ANALYST as control variables.

6.6 Conclusion

This study investigates the association between earnings quality and information asymmetry for a large sample of Japanese manufacturing firms over the period 2002-2012. My earnings quality proxies are based on modified Dechow-Dichev accrual quality model and Kasznik version of Modified Jones abnormal accruals model. I use relative bid-ask spread as a proxy for unobservable information asymmetry.

I summarize my results as follows: I begin the empirical examination of the relation between earnings quality and information asymmetry with univariate and bivariate analyses, the results of which suggest that information asymmetry increases as earnings quality deteriorates. Then I conduct multivariate regression of relative bid-ask spread on earnings quality proxies and a set of factors known to be systematically associated with the bid-ask spread. I find that poor earnings quality is significantly associated with higher level of information asymmetry, consistent with my primary hypothesis. I further investigate whether a firm's information environment affects the relationship between earnings quality and information asymmetry. I find that the impact of earnings quality on information asymmetry is more pronounced for smaller firms and those with low institutional shareholding and analyst coverage. Motivated by the findings of prior research that earnings quality is determined by both management implementation decisions and economic fundamentals, I separate earnings quality measures into two components - an innate component and a discretionary component. Then I examine the impact of each component on information asymmetry and find that both components are significantly associated with information asymmetry. The innate component has marginally higher impact on information asymmetry than discretionary component for KZABS earnings quality measure. Additionally, I perform several robustness tests and find that my findings are robust to alternative spread measurement period, different proxies of information asymmetry (the result is ambiguous for quoted depth), alternate variable specification for earnings quality, and alternative estimation procedure. On the whole, this study provides empirical support to the theoretical underpinning that disclosure of high-quality information reduces information asymmetry in the capital market. The reported findings underscore the positive impact of improved earnings quality in the capital market in terms of reducing information asymmetry among market participants.

These findings have a number of implications for the constituents of capital market such as corporate managers, general investors, regulators and standard setters. My finding of inverse relation between earnings quality and information asymmetry suggests that corporate managers seeking to reduce information asymmetry among investors and access to capital market for raising fund at a lower cost should provide high-quality information. My findings also suggest that general investors need not to spend time and resources on private information search activities when firms disseminate high-quality value relevant earnings information. Private information acquisition activities involve substantial costs and the expected benefits from trading on that information are reduced when firms disclose more high-quality public information. One of the prime goals of the regulators is to make the capital market more liquid and vibrant to general investors by reducing information inequalities. Corporation's timely disclosures of high-quality value relevant information can reduce information asymmetry by limiting the ability of informed traders to trade profitably based on private information (Frankel and Li, 2004). Therefore, the findings of this chapter are important for the regulators who seek to make the capital market more attractive to the general investors by enhancing liquidity through implementing a timely and transparent disclosure regime. An important benefit of high-quality accounting standards is enhanced liquidity in the stock market (Levitt, 1998). The evidence of higher liquidity for firms with higher earnings quality reported in this study has important policy implication for the standard setters in Japan. After the stock market crash in the 90s, Japanese government initiated several reforms of Japanese financial reporting systems including development of new accounting standards which are in line with IFRSs that are presumed to be of high quality and voluntary adoption of IFRSs. Thus, standard setters can play a key role in reducing information asymmetry by promulgating high-quality accounting standards resulting in improved earnings quality.

Chapter Seven
Conclusion

7.1 Summary

The aim of this chapter is to summarize and discuss the findings and to conclude the study. The discussion presented here are the synthesis of the findings from chapter four, five, and six that deal with the three individual indicators of stock market outcomes of earnings quality. At first, findings are discussed with the relevant literature. Then the contributions and limitations of the study are cited before explaining the areas for further study.

7.2 Findings of the Study

This study was undertaken to demonstrate empirically the stock market outcomes of earnings quality in Japanese equity market. In this thesis, I concentrate on three specific stock market outcomes namely cost of equity capital, firm-specific return volatility and information asymmetry among investors, and show that the quality of reported earnings of a broad cross-section of manufacturing firms has a significant positive impact on those outcomes. Further, I break down earnings quality measures into innate and discretionary components to examine their differential impact on those outcomes. The overall evidence supports the predominance of innate components over discretionary components in influencing the cost of equity capital, firm-specific return volatility, and information asymmetry. The specific findings for each indicator of stock market outcomes are summarized below.

Firstly, I investigate the impact of two accruals-based earnings quality measures on two proxies for implied cost of equity for a large sample of Japanese manufacturing firms covering the period 2002-2012. This investigation has been motivated by the theoretical models predicting an association between earnings quality and cost of equity capital. Specifically, I analyze the extent to which high-quality earnings are associated with benefits in the form of a lower cost of equity capital which is used as an indicator of investors' resource allocation decisions. The result shows that firms with poorer earnings quality exhibit higher cost of equity after controlling for other variables known to affect the cost of equity capital. This result is generally robust to a battery of sensitivity test, including different estimation procedures, variable specification and alternative measures of earnings quality. I also investigate whether the cost of equity effect of

earnings quality differs depending on the source of earnings quality. To understand this issue, it is important to recognize that earnings quality is affected not only by the discretionary reporting choices made by the managers (discretionary factors) but also by the firm's operating environment and its business model (innate factors). This distinction is important because managers have little control over the innate factors, at least in the short run. To assess the relative contribution of each of the above factors to the cost of equity, I decompose earnings quality into an innate component and a discretionary component following the approach outlined in Francis et al. (2005). The result shows that innate component of earnings quality has larger cost of equity effect than discretionary component. An implication of this finding is that earnings quality has larger pricing effect when it is driven by firm-specific operating and environmental uncertainty than when it is associated with management discretionary choices.

Secondly, I investigate the firm-specific return volatility effect of two accruals-based earnings quality measures for a sample of Japanese manufacturing firms for the period 2003-2012. There is a controversy in the literature over whether firm-specific return volatility captures firm-specific information or noise in stock returns. The proponents of information hypothesis argue that greater firm-specific return volatility implies more firm-specific information being impounded in stock prices whereas the advocates of noise hypothesis claim that greater firm-specific return volatility is associated with noisier stock prices. I use two different proxies for firm-specific return volatility: (1) idiosyncratic volatility based on the variance of the residual from the market model, and (2) asynchronicity or lack of synchronicity based on the coefficient of determination (R^2) from market model. Building on Li et al. (2014) argument, I posit that if firm-specific return variation represents firm-specific information, then it should be associated with proxies for better information environment. On the other hand, if firm-specific return variation captures noise, then it should be associated with proxies for poor information environment. I use bid-ask spread, Amihud (2002) illiquidity, liquidity risk, institutional ownership and zero return days as suitable surrogates for information environment. Specifically, I assume that better information environments are represented by lower bid-ask spreads, lower levels of illiquidity and liquidity risk, higher proportion of institutional holding, less zero return days and vice-versa. The result shows that both measures of firm-specific return volatility are higher in firms with poorer information environment, i.e., higher volatility is correlated with higher bid-ask spreads, higher level of illiquidity and liquidity risk, lower institutional ownership,

and more zero return days. Therefore, the evidence is more consistent with noise hypothesis. However, in an examination of the association between earnings quality and firm-specific return volatility using multivariate regression analysis, I find contradictory results. I use two different proxies for earnings quality both of which are inverse measures of earnings quality in that higher value implies lower quality: (1) accrual quality based on Dechow-Dichev (2002) model, and (2) absolute abnormal accruals based on Kasznik (1999) version of modified Jones (1991) model to test my hypotheses. Consistent with prior literature, I find a negative relation between idiosyncratic volatility and earnings quality supporting noise hypothesis but positive relation between asynchronicity and earnings quality supporting information hypothesis. Li et al. (2014) show that, although these two measures of firm-specific return volatility are intended to capture the same underlying construct, the presumed equivalence between these ostensibly comparable dependent variables is problematic. They show that researchers obtain contradictory findings when they use idiosyncratic volatility (σ_e^2) versus asynchronicity (Φ) as the dependent variable. To address this issue, they analyze the individual components of return asynchronicity, Φ and show that a firm's return asynchronicity is additively increasing in idiosyncratic return volatility, σ_e^2, but decreasing in both the inter-temporal variation in the market returns, σ_{rm}^2, and the stock's β, the individual stock return's comovement with the market return. Therefore, contradictory results could be obtained from the use of Φ versus σ_e^2 as the dependent variable in empirical tests if $\sigma_{rm}^2$and β, the two components of Φ, are also strongly related to the independent variable of interest. Based on the prediction from decomposition of asynchronicity, Li et al. (2014) suggest that controlling for firm-specific beta is important in a cross-sectional setting when asynchronicity is the preferred dependent variable. Following Li et al. (2014), I find that earnings quality is negatively related to beta and the positive relation between asynchronicity and earnings quality is primarily driven by the dominant impact of earnings quality on beta relative to the impact of earnings quality on idiosyncratic volatility. This finding emphasizes controlling of beta when asynchronicity is the dependent variable. After controlling beta in the idiosyncratic volatility and asynchronicity regression, I find that coefficients on both earnings quality measure are positive and statistically significant implying that high-quality earnings reduce firm-specific return volatility. Thus, my empirical analysis suggests that firm-specific return volatility resembles noise, and high earnings quality mitigates noise. I extend these analyses by investigating whether the firm-specific return volatility effect differs depending on the

component of earnings quality. Following Francis et al. (2005), I use two methods to isolate the components of earnings quality. The first method regresses earnings quality on several summary indicators of the firm's operating environment or business model and uses the fitted values from annual regression as the innate component of earnings quality and the residual as the discretionary component of earnings quality. The second method includes these summary indicators as additional control variables in the firm-specific return volatility tests. Regardless of the method used to distinguish the components of earnings quality, I find that innate component has significantly larger effect on firm-specific return volatility than discretionary component. This finding is consistent with earnings quality having larger effect when it is driven by firm-specific operating and environmental characteristics than when it is associated with discretionary decisions. Finally, I examine the sensitivity of the result to alternative asset pricing model. I measure idiosyncratic volatility and asynchronicity based on the variance of residuals and R^2 from Fama-French (1993) three-factor model and show that the results from traditional CAPM consistent asset pricing model are not sensitive to the alternative firm-specific return volatility measures estimated from Fama-French (1993) three-factor model.

Thirdly, I investigate the impact of earnings quality on information asymmetry among investors in the stock market for a broad cross-section of Japanese manufacturing firms over the period 2002-2012. My earnings quality proxies are based on modified Dechow-Dichev accrual quality model and Kasznik version of Modified Jones abnormal accruals model. I use relative bid-ask spread as a proxy for unobservable information asymmetry. I begin the empirical examination of the relation between earnings quality and information asymmetry with univariate and bivariate analyses, the results of which suggest that information asymmetry increases as earnings quality deteriorates. Then I conduct multivariate regression of relative bid-ask spread on earnings quality proxies and a set of factors known to be systematically associated with the bid-ask spread. I find that poor earnings quality is significantly associated with higher level of information asymmetry, consistent with my primary hypothesis. I further investigate whether a firm's information environment affects the relationship between earnings quality and information asymmetry. I find that the impact of earnings quality on information asymmetry is more pronounced for smaller firms and those with low institutional shareholding and analyst coverage. Motivated by the findings of prior research that earnings quality is determined by both management implementation decisions and economic fundamentals, I separate earnings quality

measures into two components - an innate component and a discretionary component. Then I examine the impact of each component on information asymmetry and find that both components are significantly associated with information asymmetry. The innate component has marginally higher impact on information asymmetry than discretionary component for KZABS earnings quality measure. Additionally, I perform several robustness tests and find that my findings are robust to alternative spread measurement period, different proxies of information asymmetry, alternate variable specification for earnings quality, and alternative estimation procedure.

Overall, the thesis provides empirical evidence in favor of capital market benefits of high-quality earnings. The results confirm that firms that disclose high-quality earnings information enjoy greater stock market benefits in terms of lower cost of equity capital, lower firm-specific return volatility and less information asymmetry among investors, all of which have significant implications for increasing resource allocation efficiency of the stock market.

7.3 Contributions of the Study

This study contributes to the extant literature that implicitly or explicitly links earnings quality with different capital market outcomes in the following ways.

First, there has been tremendous growth in the research on the determinants and consequences of earnings quality in last two decades considering the pervasive use of earnings or earnings-based metrics in numerous decision contexts. While most of the research is conducted in the U.S. context, the number of studies on the capital market consequences undertaken in the Japanese market is very limited. Japan has one of the best-developed equity markets in the world with sophisticated financial reporting system and distinct institutional arrangement. Following the stock market crash in the 1990s, Japanese government introduces reforms of Japanese financial systems including reforms of financial reporting and corporate governance. These reforms are known as “Big-Bang” accounting reforms in Japan. Most of the reforms were the adoption of Western-style financial reporting and governance model that is presumed to be superior. For example, in 2000, the Financial Services Agency (FSA) which is analogous to the Securities and Exchange Commission in the United States was created. Regulators set up Accounting Standards Board of Japan (ASBJ) following the model of Financial Accounting Standards Board (FASB) of U.S., promulgate new accounting standards that are in line with

IFRSs or SFASs, and allow voluntary adoption of IFRSs. All these reforms indicate that Japanese financial system is moving from a bank-oriented system to a market-oriented system where the quality of reported earnings is going to be a significant issue to the constituents of the financial reporting process. Given the second largest equity market in the world in terms of market capitalization and number of listed companies, providing evidence from Japan on the stock market consequences of earnings quality is important on its own merit. Moreover, the evidence from Japan will enhance the robustness, and assess the external validity of the results found in the U.S. markets.

Second, the study provides empirical evidence supporting the perspective that the quality of financial reporting information as captured by two accruals-based measures of earnings quality affects rational investors' capital allocation decisions in the Japanese economy by influencing the cost of equity capital. The finding indicates that earnings quality is an important factor investors consider in pricing securities. This finding is important for corporate managers who want to raise money at a cheaper cost from the capital market.

Third, this study contributes to the literature on the firm-specific return volatility consequences of earnings quality. The study highlights on the empirical linkage between firm-specific return volatility and earnings quality and shows that firms with poor earnings quality experience high firm-specific return volatility that causes trading of arbitrageurs and option traders difficult, complicates the pricing of managerial compensation policies tied to stock options and more importantly, makes portfolio diversification tricky for individual investors. While some studies attempt to explore the association between firm-specific return volatility and earnings quality, they provide inconsistent findings that limit our understanding of the true relation between firm-specific return volatility and earnings quality. By providing strong evidence on the negative relation between firm-specific return volatility and earnings quality of a firm, this study sheds light on the debate on whether greater firm-specific return volatility captures value-relevant firm-specific information or noise. The result lends credibility to noise based explanation of firm-specific return volatility.

Fourth, this study provides reliable empirical evidence that an adverse consequence of poor earnings quality is higher information asymmetry as measured by relative bid-ask spread. This finding is different from that of Ajward and Takehara (2011) who find a negative but insignificant relation (without controlling for alternative portfolio style) between absolute

abnormal accruals (Kasznik) and the degree of information asymmetry but an unexpected positive and significant relation between accruals quality (Dechow-Dichev) and the degree of information asymmetry, where they use probability of information-based trading as a proxy for information asymmetry. The differences in results could arise from using different proxies for information asymmetry or from different sample period or from applying different research design.

Fifth, in addition to documenting the impact of total earnings quality, this study attempts to distinguish the sources of earnings quality and to investigate the effect of two components of earnings quality on the cost of equity capital, firm-specific return volatility and information asymmetry among investors. Although there is no cohesive theory that differentiates the impact of two components of earnings quality, based on prior research on discretionary accounting choices, I hypothesize and find that innate component of earnings quality has a stronger effect on the cost of equity capital, firm-specific return volatility, and information asymmetry than discretionary component of earnings quality. The result suggests that the impact of earnings quality is largely driven by innate features of firms' operating environment and business models rather than management's short-term reporting choices and implementation decisions.

Finally, the research dealing with stock market outcomes of earnings quality is very sparse in Japan. Moreover, prior literature provides little guidance on the exact nature of the relationship between earnings quality and different indicators of market outcomes. Therefore, this study extends the very limited research on the consequences of earnings quality in the Japanese setting and adds to a growing body of research that examine the effect of earnings quality on the cost of equity capital, firm-specific return volatility and information asymmetry among investors.

7.4 Limitations of the Study

This study suffers from following limitations:

First, the study covers a large sample of firms from manufacturing industries only because earnings quality proxies employed in the study are believed to better reflect the operations of manufacturing firms. Although manufacturing firms account for a sizeable chunk of the Japanese stock market, considering manufacturing industries only limits the

generalizability of the results to the firms operating in other industries and to the market as a whole.

Second, the study uses accruals-based earnings quality measures. Inferences relating to earnings quality depend on the researchers' ability to accurately measure earnings quality. In a recent review of earnings quality literature, Dechow et al. (2010) suggest that earnings quality proxies available in the literature lack convergent validity since all the earnings quality proxies are not equally affected by the same determinant, or all proxies do not have similar consequences. This also implies that different proxies of earnings quality measure different constructs calling into question the construct validity of the proxies. The capital market perspective of earnings quality focuses on the precision of earnings with respect to a valuation relevant construct (Francis et al. 2006). If the proxies used in this study fail to capture the desired precision, the validity of the results will be put into question.

Third, in this study, I distinguish total earnings quality into innate and discretionary components following the approach outlined in Francis et al. (2005). This approach takes advantage of the innate factors describing firms' operating environment and business model in separating innate component from discretionary component. Thus, the accuracy of the estimates of two components is dependent on the ability of the innate factors to comprehensively reflect firms' business model and economic environment. Moreover, every earnings quality proxy is measured with error that is neither related to innate factors nor associated with reporting choices. One limitation of this approach is that it provides a separate measure of innate component and discretionary component but cannot parse out the noise. Since the residual from a regression of total earnings quality on innate factors is defined as discretionary component, it methodologically combines the effect of discretionary reporting choices and pure noise, which may confound the effect of discretionary component.

7.5 Direction for Future Research

The following are some of the issues worthy of future research that could stem directly from this research:

First, researchers have identified a variety of indicators of market outcomes in the context of earnings quality research that has established a link between earnings quality and capital market effects. In this thesis, I investigate the effect of earnings quality on the cost of equity

capital, on firm-specific return volatility, and on information asymmetry. Future research on the market outcomes of earnings quality could consider other indicators of market outcomes such as the behavior of abnormal returns or the quality of analysts' earnings forecasts as measured by accuracy and dispersion.

Second, while the study documents a significant negative association between earnings quality and cost of equity in the sense that firms with poor earnings quality experience higher cost of equity, this study does not attempt to specify any linkage through which earnings quality affects the cost of equity. Since there is no consensus among underlying mechanisms that relate earnings quality with cost of capital, future research should be directed to explore possible channels of this relation to better understand why earnings quality as a summary indicator of financial reporting quality should impact cost of equity capital which is used as a summary indicator of capital allocation decision and why managers should strive for disseminating better quality information to users of accounting information.

Third, the study confirms the existence of a significant cross-sectional association between firm-specific return volatility and earnings quality. However, examining and relating the time-series behavior of earnings quality with overtime changes in firm-specific return volatility can be an important avenue for future research for a deeper understanding of the relation between these two variables.

Fourth, prior research suggests that high-quality disclosure can affect information asymmetry by altering the trading pattern of uninformed investors or by discouraging costly private information search activities. While the findings of this study suggest an inverse relation between earnings quality and information asymmetry, this study does not uncover the exact channel through which earnings quality is linked with information asymmetry. Therefore, future research may consider exploring the underlying mechanism through which poor earnings quality leads to higher information asymmetry with a view to enriching our understanding of the relation between earnings quality and information asymmetry.

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Appendix A: Definition of Variables from Chapter Four

Variable		Definition
		Implied Cost of Equity Measures
Earning-price ratio	EP	Annual earnings per share (positive) of firm *i* divided by the stock price three months after fiscal year end *t*.
Industry-adjusted earnings-price ratio	IndEP	The difference between EP ratio of firm *i* and the median industry EP ratio in year *t*.
Easton's implied cost of equity	CoE	Implied cost of equity of firm *i* in year *t* estimated based on Easton (2004) PEG ratio approach.
		Earnings Quality Variables
Dechow-Dichev Accruals quality	DDSTD	Standard deviation of residuals estimated from a modified Dechow and Dichev (2002) model for firm *i* over years *t-4* through *t*. $TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \nu_{i,t}$, where $TCA_{i,t}$ is the total current accruals (using the balance sheet approach), $CFO_{i,t}$ is the cash flow from operations, $\Delta REV_{i,t}$ is the change in total revenue, $PPE_{i,t}$ is the gross value of property, plant, and equipment, and all variables in the equation are deflated by average total assets. I estimate the above model for every industry-year in each of the 15 Nikkei two-digit industry groups in which I require at least 10 firms in year *t*.
Innate component	InnateEQ	InnateEQ is the fitted value from Eq. (4.4) where the dependent variable is DDSTD.
Discretionary component	DiscEQ	DiscEQ is the residual from Eq. (4.4) where the dependent variable is DDSTD.
Kasznik's absolute abnormal accruals	KZABS	The absolute value of abnormal accruals from Kasznik version of Jones (1991) model. $TA_{i,t} = \delta_0 + \delta_1(\Delta REV_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 \Delta CFO_{i,t} + \eta_{i,t}$, where $TA_{i,t}$ is the total accruals (using the balance sheet approach), $\Delta REV_{i,t}$ is the change in total revenue, $\Delta AR_{i,t}$ is the change in net accounts receivable, $PPE_{i,t}$ is the gross value of property, plant, and equipment, $\Delta CFO_{i,t}$ is the change in cash flows from operation, and all variables in the equation are deflated by average total assets. I estimate the above model for every industry-year in each of the 15 Nikkei two-digit industry groups in which I require at least 10 firms in year *t*.
Innate component	InnateEQ	InnateEQ is the fitted value from Eq. (4.4) where the dependent variable is KZABS.
Discretionary component	DiscEQ	DiscEQ is the residual from Eq. (4.4) where the dependent variable is KZABS.
		Earnings Quality Measurement Variables
Total current accruals	TCA	Total current accruals = ΔCA – ΔCL – ΔCash + ΔSTDEBT where ΔCA is the change in current assets, ΔCL is the change in current liabilities, ΔCash is the change in cash, ΔSTDEBT is the change in short-term debt included in current liabilities.
Total accruals	TA	Total accruals = TCA – DEP where TCA is the total current accruals and DEP is the depreciation and amortization expense.
Cash flows from operation	CFO	Cash flows from operation = NI – TA where NI is the net income and TA is the total accruals. OR Cash flows from operation = NI – TCA + DEP where NI is the net income, TCA is the total current accruals and DEP is the depreciation and amortization expense

Change in revenue	ΔREV	Changes in total revenues from year *t-1* to year *t* for firm *i*.
Property, plant and equipment	PPE	The gross value of property, plant, and equipment of firm *i* at year *t*.
Change in accounts receivable	ΔAR	Changes in net accounts receivable from year *t-1* to year *t* for firm *i*.
Change in cash flows from operation	ΔCFO	Changes in cash flows from operation from year *t-1* to year *t* for firm *i*.
Earnings Quality Determinants Variables		
Size	ASSET	Firm size is proxied by the natural log of firm *i*'s total assets in year *t*.
Cash flows volatility	VCFO	The standard deviation of firm *i*'s rolling five-year cash flows from operation, scaled by average total assets.
Sales volatility	VSALES	The standard deviation of firm *i*'s rolling five-year sales revenues, scaled by average total assets.
Operating cycle	OPCYCLE	The natural log of the sum of firm *i*'s days accounts receivable and days inventory in year *t*. Days accounts receivable = 360/(Sales/Average accounts receivable). Days inventory = 360/(Cost of goods sold/Average inventory)
Incidence of negative earnings	NEG	Firm *i*'s proportion of losses over the prior five years.
Intangible intensity	INTAN	The sum of firm *i*'s reported R&D and advertising expense as a proportion of its sales revenues in year *t*; missing values of R&D and advertising expense are set to zero.
Absence of reported intangible	INTANDUM	The absence of reported intangible is captured by an indicator variable, INTANDUM, which is equal to 1 for firms with INTAN = 0, and 0, otherwise.
Capital intensity	CAPITAL	The ratio of firm *i*'s net book value of property, plant, and equipment to total assets in year *t*.
Control Variables		
Systematic risk	BETA	The market beta for firm *i* in year *t* is measured using the market model of CAPM, estimated using monthly returns data over a rolling five-year windows; I require a firm to have at least 18 monthly returns for this estimation. The NPM Topix return is used as the market return.
Firm size	SIZE	Natural logarithm of market capitalization. Market capitalization is calculated as the closing price at fiscal year-end times the number of shares outstanding at fiscal year-end.
Book-to-market ratio	BM	Fiscal-year-end book value of equity over fiscal-year-end market value of equity.
Leverage	LEV	Firm *i*'s ratio of interest-bearing debt to market value of equity in fiscal year *t*.

Appendix B: Definition of Variables from Chapter Five

Variable		Definition
Firm-specific Return Volatility Variables		
Idiosyncratic volatility	$[\sigma_e^2]$, $\ln[\sigma_e^2]$	Variance of daily excess returns adjusted for the expected returns of the market model (CAPM) for firm *i* in fiscal year *t*. Specifically, $[\sigma_e^2]$ is the variance of residuals from a regression of stock return on market index return on a daily basis. $\ln[\sigma_e^2]$ is the natural logarithm of $[\sigma_e^2]$.
Asynchronicity	Φ	$\ln[(1-R^2)/R^2]$ and R^2 is estimated from the market model (CAPM) for firm *i* in fiscal year *t*.
Beta squared	$[\beta^2]$, $\ln[\beta^2]$	Beta squared for firm *i* in fiscal year *t*. Beta squared is the square of market beta estimated from the market model (CAPM) using daily returns in a fiscal year. $\ln[\beta^2]$ is the natural logarithm of $[\beta^2]$.
Earnings Quality Variables		
Accruals quality	DDSTD	Standard deviation of residuals estimated from a modified Dechow and Dichev (2002) model for firm *i* over years *t-4* through *t*. $TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \nu_{i,t}$, where $TCA_{i,t}$ is the total current accruals (using the balance sheet approach), $CFO_{i,t}$ is the cash flow from operations, $\Delta REV_{i,t}$ is the change in total revenue, $PPE_{i,t}$ is the gross value of property, plant, and equipment, and all variables in the equation are deflated by average total assets. I estimate the above model for every industry-year in each of the 15 Nikkei two-digit industry groups in which I require at least 10 firms in year *t*.
Innate component	InnateEQ	InnateEQ is the fitted value from Eq. (5.8) where the dependent variable is DDSTD.
Discretionary component	DiscEQ	DiscEQ is the residual from Eq. (5.8) where the dependent variable is DDSTD.
Absolute value of abnormal accruals	KZABS	The absolute value of abnormal accruals from Kasznik version of modified Jones (1991) model. $TA_{i,t} = \delta_0 + \delta_1(\Delta REV_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 \Delta CFO_{i,t} + \eta_{i,t}$, where $TA_{i,t}$ is the total accruals (using the balance sheet approach), $\Delta REV_{i,t}$ is the change in total revenue, $\Delta AR_{i,t}$ is the change in accounts receivable, $PPE_{i,t}$ is the gross value of property, plant, and equipment, $\Delta CFO_{i,t}$ is the change in cash flows from operation, and all variables in the equation are deflated by average total assets. I estimate the above model for every industry-year in each of the 15 Nikkei two-digit industry groups in which I require at least 10 firms in year *t*.
Innate component	InnateEQ	InnateEQ is the fitted value from Eq. (5.8) where the dependent variable is KZABS.
Discretionary component	DiscEQ	DiscEQ is the residual from Eq. (5.8) where the dependent variable is KZABS.
Earnings Quality Measurement Variables		
Total current accruals	TCA	Total current accruals = $\Delta CA - \Delta CL - \Delta Cash + \Delta STDEBT$ where ΔCA is the change in current assets, ΔCL is the change in current liabilities, $\Delta Cash$ is the change in cash, $\Delta STDEBT$ is the change in short-term debt included in current liabilities.
Total accruals	TA	Total accruals = TCA – DEP where TCA is the total current accruals and DEP is the depreciation and amortization expense.
Cash flows from operation	CFO	Cash flows from operation = NI – TA where NI is the net income and TA is the total accruals. OR

		Cash flows from operation = NI – TCA + DEP where NI is the net income, TCA is the total current accruals and DEP is the depreciation and amortization expense
Change in revenue	ΔREV	Changes in total revenues from year *t-1* to year *t* for firm *i*.
Property, plant and equipment	PPE	The gross value of property, plant, and equipment of firm *i* at year *t*.
Change in accounts receivable	ΔAR	Changes in net accounts receivable from year *t-1* to year *t* for firm *i*.
Change in CFO	ΔCFO	Changes in cash flows from operation from year *t-1* to year *t* for firm *i*.
Earnings Quality Determinants Variables		
Total assets	ASSET	Firm size is proxied by the natural log of firm *i*'s total assets in year *t*.
Cash flows volatility	VCFO	The standard deviation of firm *i*'s rolling five-year cash flows from operation, scaled by average total assets.
Sales volatility	VSALES	The standard deviation of firm *i*'s rolling five-year sales revenues, scaled by average total assets.
Operating cycle	OPCYCLE	The natural log of the sum of firm *i*'s days accounts receivable and days inventory in year *t*. Days accounts receivable = 360/(Sales/Average accounts receivable). Days inventory = 360/(Cost of goods sold/Average inventory)
Incidence of negative earnings	NEG	Firm *i*'s proportion of losses over the prior five years.
Intangible intensity	INTAN	The sum of firm *i*'s reported R&D and advertising expense as a proportion of its sales revenues in year *t*; missing values of R&D and advertising expense are set to zero.
Absence of reported intangible	INTANDUM	The absence of reported intangible is captured by an indicator variable, INTANDUM, which is equal to 1 for firms with INTAN = 0, and 0, otherwise.
Capital intensity	CAPITAL	The ratio of firm *i*'s net book value of property, plant, and equipment to total assets in year *t*.
Control Variables		
Earnings related value-relevant information	RET^2	The squared annual buy and hold return for firm *i* in fiscal year *t*. To be consistent with the measurement of idiosyncratic volatility, measured as the variance of stock return, I use the squared transformation of stock returns.
Informativeness of earnings quality for future cash flows	CFO	Net income less total accruals scaled by average total assets. Firm *i*'s cash flows from operation for year *t+1* is used as a proxy for informativeness of earnings quality for future cash flows.
Operating performance	ROE	Return on equity is calculated as net income divided by lagged book value of equity.
Firm size	SIZE	Natural logarithm of market capitalization. Market capitalization is calculated as the closing price at fiscal year-end times the number of shares outstanding at fiscal year-end.
Leverage	LEV	Firm *i*'s ratio of long-term debt to total assets in fiscal year *t*.
Book-to-market ratio	BM	Fiscal-year-end book value of equity over fiscal-year-end market value of equity.
Stock return performance	RET	Contemporaneous buy and hold returns for firm *i* in fiscal year *t*.
Loss firms	LOSS	A dummy variable that is set to 1 if the firm-year reports negative earnings or losses and 0, otherwise.
Return skewness	SKEW	Skewness of the firm-specific daily return for firm *i* in fiscal year *t*.
Return kurtosis	KURT	Kurtosis of the firm-specific daily return for firm *i* in fiscal year *t*.

Information Environment Variables		
Bid-ask spread	SPREAD	The average of daily bid-ask spread for firm *i* in fiscal year *t*. The daily spread is calculated as the absolute difference between daily closing quoted ask price and closing quoted bid price, deflated by the mid-point of ask and bid price. I drop those days for which either ask price or bid price is zero from my calculation of spread measure. Finally, I require at least 150 days of non-zero ask and bid price for bid-ask spread calculation.
Illiquidity measure	ILLIQUID	The illiquidity of a stock is measured as the average of daily price impact of trade. Following Amihud (2002), I compute the daily price impact of trade as |Return×100|/(Price×Volume/1,000), where Return is the daily stock return, Price is the daily closing price of the stock and Volume is the daily trading volume.
Liquidity risk	ILLIQVOL	Annual standard deviation of the daily ILLIQUID measure for firm *i* in fiscal year *t*.
Institutional ownership	INSTITUTE	The proportion of outstanding shares held by institutional investors for firm *i* in fiscal year *t*.
Zero return days	ZRDAYS	The ratio of total number of days yielding zero returns in a fiscal year *t* to total number of trading days in that fiscal year for firm *i*.

Appendix C: Definition of Variables from Chapter Six

Variable		Definition
		Information Asymmetry Variable
Bid-ask spread	SPREAD	The average of daily bid-ask spread for firm *i* in year *t*. The daily spread is calculated as the difference between daily closing quoted ask price and closing quoted bid price, deflated by the mid-point of ask and bid price. I drop those days for which either ask price or bid price is zero from my calculation of spread measure. Finally, I require at least 150 days of non-zero ask and bid price for bid-ask spread calculation. I use natural log of spread measure in empirical analysis.
		Earnings Quality Variables
Accruals quality	DDSTD	Standard deviation of residuals estimated from a modified Dechow and Dichev (2002) model for firm *i* over years *t-4* through *t*. $TCA_{i,t} = \varphi_0 + \varphi_1 CFO_{i,t-1} + \varphi_2 CFO_{i,t} + \varphi_3 CFO_{i,t+1} + \varphi_4 \Delta REV_{i,t} + \varphi_5 PPE_{i,t} + \nu_{i,t}$, where $TCA_{i,t}$ is the total current accruals (using the balance sheet approach), $CFO_{i,t}$ is the cash flow from operations, $\Delta REV_{i,t}$ is the change in total revenue, $PPE_{i,t}$ is the gross value of property, plant, and equipment, and all variables in the equation are deflated by average total assets. I estimate the above model for every industry-year in each of the 15 Nikkei two-digit industry groups in which I require at least 10 firms in year *t*.
Innate component	InnateEQ	InnateEQ is the fitted value from Eq. (6.5) where the dependent variable is DDSTD.
Discretionary component	DiscEQ	DiscEQ is the residual from Eq. (6.5) where the dependent variable is DDSTD.
Absolute value of abnormal accruals	KZABS	The absolute value of abnormal accruals from Kasznik version of modified Jones (1991) model. $TA_{i,t} = \delta_0 + \delta_1(\Delta REV_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 \Delta CFO_{i,t} + \eta_{i,t}$, where $TA_{i,t}$ is the total accruals (using the balance sheet approach), $\Delta REV_{i,t}$ is the change in total revenue, $\Delta AR_{i,t}$ is the change in accounts receivable, $PPE_{i,t}$ is the gross value of property, plant, and equipment, $\Delta CFO_{i,t}$ is the change in cash flows from operation, and all variables in the equation are deflated by average total assets. I estimate the above model for every industry-year in each of the 15 Nikkei two-digit industry groups in which I require at least 10 firms in year *t*.
Innate component	InnateEQ	InnateEQ is the fitted value from Eq. (6.5) where the dependent variable is KZABS.
Discretionary component	DiscEQ	DiscEQ is the residual from Eq. (6.5) where the dependent variable is KZABS.
		Earnings Quality Measurement Variables
Total current accruals	TCA	Total current accruals = ΔCA – ΔCL – ΔCash + ΔSTDEBT where ΔCA is the change in current assets, ΔCL is the change in current liabilities, ΔCash is the change in cash, ΔSTDEBT is the change in short-term debt included in current liabilities.
Total accruals	TA	Total accruals = TCA – DEP where TCA is the total current accruals and DEP is the depreciation and amortization expense.
Cash flows from operation	CFO	Cash flows from operation = NI – TA where NI is the net income and TA is the total accruals. OR Cash flows from operation = NI – TCA + DEP where NI is the net income, TCA is the total current accruals and DEP is the depreciation and amortization expense

Change in revenue	ΔREV	Changes in total revenues from year *t-1* to year *t* for firm *i*.
Property, plant and equipment	PPE	The gross value of property, plant, and equipment of firm *i* at year *t*.
Change in accounts receivable	ΔAR	Changes in net accounts receivable from year *t-1* to year *t* for firm *i*.
Change in CFO	ΔCFO	Changes in cash flows from operation from year *t-1* to year *t* for firm *i*.
Earnings Quality Determinants Variables		
Total assets	ASSET	Firm size is proxied by the natural log of firm *i*'s total assets in year *t*.
Cash flows volatility	VCFO	The standard deviation of firm *i*'s rolling five-year cash flows from operation, scaled by average total assets.
Sales volatility	VSALES	The standard deviation of firm *i*'s rolling five-year sales revenues, scaled by average total assets.
Operating cycle	OPCYCLE	The natural log of the sum of firm *i*'s days accounts receivable and days inventory in year *t*. Days accounts receivable = 360/(Sales/Average accounts receivable). Days inventory = 360/(Cost of goods sold/Average inventory)
Incidence of negative earnings	NEG	Firm *i*'s proportion of losses over the prior five years.
Intangible intensity	INTAN	The sum of firm *i*'s reported R&D and advertising expense as a proportion of its sales revenues in year *t*; missing values of R&D and advertising expense are set to zero.
Absence of reported intangible	INTANDUM	The absence of reported intangible is captured by an indicator variable, INTANDUM, which is equal to 1 for firms with INTAN = 0, and 0, otherwise.
Capital intensity	CAPITAL	The ratio of firm *i*'s net book value of property, plant, and equipment to total assets in year *t*.
Control Variables		
Stock price	PRICE	The mean value of daily closing price for firm *i* in year *t*. I require at least 150 days of closing price for a firm in a year to compute this variable. This variable is log transformed.
Trading volume	VOLUME	The mean value of daily trading volume for firm *i* in year *t*. The calculation requires minimum 150 days of trading volume in shares for a firm in a year. I take natural log of this variable.
Stock return volatility	VOLATILITY	The variance of daily stock returns for firm *i* in year *t*. I require at least 150 days of return data to measure return volatility. I log transform this variable.
Firm size	SIZE	Natural logarithm of market capitalization. Market capitalization is calculated as the year-end closing price times the number of shares outstanding at year-end.
Market-to-book ratio	MB	Firm *i*'s ratio of market value of equity to book value of equity in year *t*. Market value of equity is estimated as the year-end closing price times the number of shares outstanding at year-end. I use logarithmic transformation of this variable.
Leverage	LEV	Firm *i*'s ratio of interest-bearing debt to market value of equity in year *t*. I use log transformation of this variable.
Institutional ownership	INSTITUTE	The proportion of outstanding shares held by institutional investors for firm *i* in year *t*.
Number of analyst following	ANALYST	The maximum number of individual analysts providing next year earnings forecasts for firm *i* in year *t*.