Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Finance

Earnings Quality and Bank Equity

By

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Declaration

I certify that the studies presented in this thesis were entirely undertaken by me. All references used in this thesis have been appropriately acknowledged.

Abstract

This doctoral thesis reports the results of three studies that address the implications of two bank characteristics - bank efficiency and bank earnings quality - for bank dividend policy and specified capital market outcomes. Chapter 1 introduces the thesis.

The first study links the market reactions to dividend change announcements by banks to changes in bank efficiency score, our new measure of bank overinvestment problem, derived from a frontier analysis of bank input-output combinations. We find that improvement in bank overinvestment problem, defined as changes in bank efficiency, is significantly and positively associated with market reactions following dividend increases. However, consistent with the moderating role of bank regulation, we find no support for the role of changes in bank efficiency in market reactions to dividend decreases.

The second study establishes a link between bank earnings quality and bank cost of equity capital. Using various earnings quality measures, the study finds that banks with better earnings quality experience lower cost of equity capital. Consistent with this primary finding, our results also support the idea that banks with higher earnings quality enjoy higher market valuation and higher price-earnings multiples compared to banks with lower earnings quality. Overall, our results suggest that markets can differentiate between "good" and "bad" earnings and seem to compensate banks with better earnings quality.

The third study contributes to the literature by first developing a country-specific index of bank earnings quality. We further hypothesise that banks in countries characterised by high earnings quality pay more dividends than banks in countries with lower earnings quality. Our data give support to this hypothesis. Finally, using modified partial adjustment models that incorporate our index of earnings quality, we find that the dividend-earnings relation is stronger for banks operating in countries with high earnings quality than for banks operating in countries with low earnings quality.

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1 Introduction

1.1 Introduction and Motivation

The importance of the banking system has received recognition from economists for centuries, in particular, from Smith (1776), who highlights the importance of banks through their liquidity creation function in helping the commerce of Scotland. He notes, 'that the trade and industry of Scotland, however, have increased very considerably during this period, and that the banks have contributed a good deal to this increase, cannot be doubted.' Hamilton (1781) argues that 'banks were the happiest engines that were invented' for encouraging economic growth and development. More recently, Corrigan (1982) and Volcker (1983), suggest that banks, because of their influence in determining the size and growth of the money supply, are important in the transmission mechanism of monetary policy. In serving this transmission role, banks have been the special institutions that link the central bank to the commercial sector of the economy, through the stock of bank deposit and asset allocation decisions.[1]

However, the recurring banking crises and their reverberating impact on all facets of economies around the world seem to support Adams' (1819) alternative position that 'banks harm morality, tranquillity and even wealth of nations.'[2] Perhaps, 'banks are nothing more, nothing less than intermediaries' (Bossone, 2001) except that governments, through regulations have made them special (England, 1991), and neither is anything special in the loans they offer (Black, 1975; Fama, 1980).

Evidence supporting the destabilising role of banks, as strongly expressed by Adams abounds in recent literature. For example, Caprio and Klingebiel (1999) and Demirguc-Kunt et al. (2006) report that as many as thirty-five countries experienced banking crises between 1985 and 1995, the result of which their banking systems virtually stopped functioning while the countries entered recessions. With regard to the US, in particular,

[1] Studies by Gerschenkron (1962), Hellwig (1991), Greenwood and Jovanovic (1990), and Levine et al. (2000) also highlight the positive influence of banks on economic development of countries.

[2] Adams' view later received support as during the Great Depression one-third of US banks (about 10000) failed between 1929-33 (Mishkin, 2009, 206) wiping out $140 billion of depositors' funds.

between 1985 and 1990, bank failures averaged 170 banks per year (England, 1991). In addition, the fact that bank failures triggered the more recent economic crisis is not an overstatement. Underlying the role of banks in the crisis is the fact that between October 2007 and July 2011, the Federal Deposit Insurance Corporation (FDIC) recorded 405 failed US banks, 94% of which occurred since August 2007, when the current economic crisis started.[3]

These crises bring to the fore pervasive questions that have engaged theorists and empiricists on the nature of banks and their role in the allocation of economic resources. Why do banks exist especially if the externalities from their existence are incidences of bank crises, which create regular taxpayer funded black hole in the banking industry? In fact, in a world *á* la Arrow-Debreu with complete and symmetric information between market participants, and where market frictions such as tax and agency cost are non-existent, there is neither a need for money nor banks and other financial intermediaries as investors and borrowers are able to achieve efficient risk allocation on their own.

As Freixas and Rochet (2008, 10) show, analogous to the Modigliani-Miller theorem, if firms and households have unrestricted access to perfect financial market, then in a competitive equilibrium, banks make zero profits and the size and composition of bank balance sheets, and their decisions have no effect on other economic agents because households are completely indifferent between deposits and securities. Similarly, firms are completely indifferent as to bank credit (financial institutions) versus securities (financial markets).[4]

The reality of market frictions provides plausible explanations for the existence of banks and their importance in economic growth and development. By moving away from the perfect and complete market paradigm to an imperfect and incomplete market paradigm, intermediation theories provide formal justifications for the existence of financial intermediaries, especially banks. These theories, which also support the special nature of banks as economic entities, argue along two lines: that economic agents come together to form financial intermediaries in order to mitigate economic consequences of (1) transaction costs and (2) information asymmetries, resulting from an imperfect market. Thus, banks exist to provide specific services that benefit suppliers of funds, who otherwise prefer to hold cash as they view direct investment in financial claims and markets as an unattract-

[3] This list includes only failed depository banks and excludes failed investment banks, such as Bear Stearns and Lehman Brothers, as the FDIC does not cover these and similar banks. We retrieved these data on 23 July 2011 from the website of FDIC: http://www.fdic.gov/bank/individual/failed/banklist.html

[4] See, for example, Hagen (1976).

ive proposition due to monitoring costs, liquidity costs, and price risks (Saunders and Cornett, 2009, 13).

The transaction cost explanation (e.g. Gurley and Shaw, 1960) views financial intermediaries as agents that exist primarily to transform securities issued by firms (shares and bonds) to securities demanded by investors (deposits and loans). Financial intermediaries are important because they provide services of divisibility and risk transformation, which borrowers cannot obtain on their own, under identical conditions due to transaction costs and limits to diversification. In particular, the fixed cost of asset evaluation implies that financial intermediaries have advantage over individuals because they allow cost-sharing resulting in lower trading cost, which ensures that intermediaries are better able to diversify their risk than individuals can (Allen and Santomero, 1997).

Modern theories based on information asymmetries suggest that financial intermediaries, such as banks, are unique in the provision of liquidity insurance, payment services, transformation of assets, management of risk, monitoring of borrowers, and production of information (e.g. Gorton and Winton, 2003; Freixas and Rochet, 2008; Saunders and Cornett, 2009).[5] These banking roles provide explanations for the nature of bank balance sheet and the fragility of their capital structure. For example, the provision of liquidity insurance explains the liability side of a bank's balance sheet, which serves as medium of exchange and the monitoring role explains the assets side of its balance sheet. However, as with explanations based on the transaction cost theory, none of the explanations based on the theory of information asymmetry stands alone as a satisfactory explanation of intermediaries; rather they are complementary.

Freeman (1996) extends the role of banks in the payment system to that of providing liquidity for the system. Banks provide liquidity to the system through the role played by their liabilities as medium of exchange and payment. Following Diamond and Dybvig (1983), Freixas and Rochet (2008, 16) describe banks as 'pools of liquidity' or 'coalitions of depositors' that provide households with insurance against idiosyncratic liquidity shocks. Freixas and Rochet (2008, 23) show that in an economy in which agents are individually subject to independent liquidity shocks, market allocation can be improved by a deposit contract offered by a financial intermediary. It is the ability of banks to satisfy the liquidity needs of suppliers of funds and borrowers, using different classes of assets that define their role as asset transformers as they purchase illiquid financial claims and finance these purchases by selling financial claims to householders and other funds suppliers in the form of liquid and divisible deposits. Banks, compared to other financial

[5] Saunders and Cornett (2009, 378) give a more exhaustive list and discussion of these functions.

institutions are efficient in financing illiquid assets with liquid liabilities because of their ability to diversify and substantially reduce transaction costs.

Consistent with theoretical literature, a recent empirical study supports the importance of banks, in particular, their ability to create liquidity. Berger and Bouwman (2009) develop four innovative measures of bank-level liquidity creation. The authors report that banks in the US created liquidity in excess of $2.8 trillion as of 2003, which represents nearly double of the value in real terms for 1993. They note that "large banks" (about 2% of the sample) created as much as 81% of the liquidity and that banks create only about half of their liquidity on the balance sheet, highlighting the importance of off-balance sheet liquidity creation. However, the provision of liquidity service by banks leaves them exposed to systemic risk that justifies their regulation and explains the fragility of their capital structure and their susceptibility to runs as banks operate with a balance sheet characterised by greater value of liquid deposits relative to the liquidation value of assets. (Diamond and Rajan, 2001).

Diamond and Rajan (2001) further suggest an explanation for the existence and uniqueness of banks in an environment where both investors and borrowers care about liquidity. They argue that investors demand liquidity because they are uncertain about the time at which they may want to reduce their holding of financial assets, while borrowers demand liquidity because they are uncertain about their ability to raise funds in the future. An intermediary that accepts deposits and extends loans is valuable in that setting because it enables depositors to have better access to their funds than they would if they invested directly in firms. The intermediary also insures borrowers against the risk that funding will cease without notice, were they to borrow from an investor. Banks meet the needs of investors by offering deposits, payable at par on demand, and providing loans to borrower according to their risk profile.

However, why is it optimal for a single entity to simultaneously provide both the liquidity functions of deposit-taking and lending? Fama (1980, 1985) Calomiris and Kahn (1991) Flannery (1994) and Kashyap et al. (2002) examine why banks finance long-term illiquid investment with short-term liquid liabilities. According to these authors, lending and deposit-taking are the two manifestations of provision of liquidity on demand and banks enjoy synergies between the two activities to the extent that both require banks to hold large balances of liquid assets. If deposit withdrawals and commitment takedowns are imperfectly correlated, the two activities can share the costs of the liquid-asset stockpile (see, also, Holmstrom and Tirole, 1998).

Diamond (1984) drawing on the banker-customer pedagogic put forward by Schum-

peter (1939), the single-agent-single principal literature, as well as the literature on information asymmetry, develops a theory of financial intermediation based on the minimum cost of production of information useful for resolving incentive problems. Diamond argues that, although monitoring is costly, banks have cost advantage in collecting and producing information because available alternatives that involve individual lenders either result in costly duplication of efforts or a free rider problem, in which no lender monitors. Because of their competitive (net cost) advantage in the production of information, banks are delegated the task of costly monitoring of loan contracts written with firms who borrow from them. As with the explanation relating to liquidity insurance, the key to the existence of banks in this set-up is an informational problem under which firms have more information about their investment projects than investors do. Investors may choose, however, to delegate monitoring to a bank through which they all provide funding to the firm (see, also, Seward, 1990). This monitoring role and the long-term relationship that develops from it prevent adverse selection and opportunistic behaviour of the borrower, including moral hazard and costly state verification (Mayer, 1988).

The idea that banks serve as delegated monitors by granting loans to firms seems to receive empirical support from Best and Zhang (1993), who investigate market reactions to new loan announcements by firms. The authors report positive stock price reactions to new loan announcements, consistent with the role of banks as delegated monitors and their comparative advantage in evaluating risky lending opportunities, where new loan announcements serve as "seal of approval" concerning a prospective borrower's credit worthiness. This result is also consistent with the role of banks as producers of valuable information.

However, Campbell and Kracaw (1980), while contributing to the information production role of intermediaries, argue against the implication that information production is a sufficient and primary condition for the emergence of intermediaries in an otherwise perfect capital market. Instead, they argue that intermediaries emerge as information producers because the production of information, the protection of confidentiality, the provision of transactions services, as well as other intermediary services are, naturally, complementary activities.

Leland and Pyle (1977) justify the existence of financial intermediaries by considering the benefits obtained by borrowers when they form coalitions, provided they can truthfully communicate the quality of their projects within the coalition. They hypothesise that the informational asymmetry that characterises capital markets is the primary and sufficient explanation for the existence of intermediaries, such as banks. They argue

that the moral hazard resulting from asymmetry information between the lenders and borrowers, in which the latter party has superior and private information, suggests that market value must reflect the average project quality. However, because the capital market places average value that is greater than average cost on low quality projects, under information asymmetry poor quality projects swamp high quality projects. Furthermore, because the verification of true characteristics by outside parties may be costly or impossible the resulting poor information transfer implies that markets may perform poorly as the probability that the projects for which all information is known and which merit financing cannot be undertaken because of the high cost of capital resulting from low average project quality. Leland and Pyle (1977) argue that something is special about intermediation, which mitigates the problems of moral hazard and appropriability that affect the production of information.[6] They suggest that an intermediary could resolve both the moral hazard and appropriability problem by investing its wealth in assets about which it claims to have produced valuable information.

However, what explains the coexistence of financial intermediaries and financial markets? According to Diamond (1984), the increasing returns in the monitoring technology implied that a monopoly bank should emerge and replace financial markets. The study by Diamond and Dybvig (1983) suggests that the existence of financial markets typically impairs the provision of liquidity insurance by deposit banks. A second generation of models focuses on the coexistence of financial markets and financial intermediaries. These models attempt to explain the financial choice of firms between issuing securities in the financial markets (direct finance) and borrowing from a bank (monitored finance). Different, but complementary, explanations of this choice have been analysed formally in the literature. According to these models, firms with the best reputation (Diamond, 1991), the highest level of collateral (Holmstrom and Tirole, 1997), the best technology (Boot and Thakor, 1997) or the best credit rating (Bolton and Freixas, 2000) are more likely to choose direct finance thus supporting a role for banks and other financial institutions even in the presence of financial markets.

The special nature and functions of banking that we discuss above introduce another dimension to the discussion of banking literature. As banks deliver on their services to individual suppliers of capital and the economy they face potential risk, which may affect their ability to perform with the costly impact on suppliers and users of funds as well as the economy. Because of this, banks operate in a highly regulated environment designed

[6] See Gorton and Winton (2003) for a description of these problems and their impact on information production.

to increase the information available to investors and ensure the soundness of the financial system and safety and efficiency of the payment system. The existence of asymmetric information in financial markets is associated with the dual problem of adverse selection and moral hazard that may hinder the efficient operation of financial markets. This asymmetric information is potentially inimical to the survival and soundness of financial intermediaries. As depositors may not be able to assess whether a depository institution is sound, a shadow of a doubt about the overall health of financial intermediaries may lead to runs on both sound and unsound institutions. This bank panic further exacerbates the adverse selection and moral hazard problems in credit markets, produces large losses for the public and causes serious damage to the economy. It is for these reasons that banks and other financial institutions are highly regulated. Although they might impose private cost on individual financial institutions and their managers, bank regulations are aimed at increasing the efficiency of financial markets by reducing the adverse selection and moral hazard problems. Consequently, regulation is an attempt to enhance the social welfare benefits and mitigate the risks in the provision of financial intermediation services (Saunders and Cornett, 2009, 18).

In view of potential negative impact of bank failures on local, national, and international economies, numerous proposals aimed at protecting banks from runs receive attention in the banking literature. Perhaps, the most popular of these are the deposit insurance schemes, a version of which was first introduced in the US in 1934 after the bank failures of 1930-1933. These schemes aim to provide protection for depositors and an insurance guarantee for banks against runs. However, at least two practical difficulties are associated with these schemes. First, because deposit insurance protects depositors from loss, the provider of deposit insurance assumes the potential risk of the depositors. This reduces the motivation for depositors to monitor banks and to demand an appropriate interest rate that matches the risk of the bank. In addition, deposit insurance is associated with moral hazard problems when the deposit insurer charges all insured banks a flat rate premium, as more risky banks do not fully reflect the additional risk in their cost of capital and therefore have incentives to take on more risk.

Proposals to mitigate the moral hazard (risk-shifting incentive) associated with deposit insurance have taken the form of charging banks risk-based insurance premium and the regulation of banks capital structure. The latter became an internationally coordinated measure starting with the introduction of Basle I in 1988 and culminating in Basle II issued in 2004.

Notwithstanding the economic importance of banks, the special nature of banks and

the implication of their high regulatory environment have influenced academic literature as banks and other financial institutions receive little attention on important and interesting issues that have implications for better understanding of firms. We appreciate that the special nature of banks, in particular their regulatory environment, places constraints on banks by limiting the scope of their investment, capital structure, and dividend decisions. These constraints ensure that banks are substantially different from industrial firms in terms of their operations, leverage, and accounting. However, we do not appreciate a near complete exclusion of banks from important and interesting accounting and finance issues.[7] Perhaps, the neglect of banks from empirical literature is more in line with widespread view that we can ignore financial intermediaries because they have no real effect; they are a veil; they do not affect asset prices or the allocation of resources (Allen, 2001); and, in lieu of a less academic adjective often used, they are uninteresting and unattractive. As evidence of this view, Allen (2001) points out that the millennium issue of the *Journal of Finance* contained surveys on asset pricing, continuous time finance, and corporate finance but did not survey financial intermediaries.

In view of this limitation, the importance of a better understanding of the factors affecting bank performance, and the outcomes of bank corporate choices, the thesis fills some gaps in the literature by investigating, using bank-level and country-level data as appropriate, the capital market consequences of bank information quality and its relation to bank corporate policy, in particular dividends. The thesis also provides exploratory evidence on the link between firm efficiency and dividend policy, an issue that receives little attention in studies relating to banking and non-banking firms.

The remainder of this introductory chapter proceeds as follows. In Section 1.2, we review the literature relating to the subject areas of the research, while in Section 1.3 we present a summary of findings relating to the three broad issues that we examine in the thesis.

1.2 Thesis Areas Literature Review

While we provide further literature review in each chapter that relates to the issue that we research, in this section, we provide a brief review of the literature to place the thesis in context, right from the outset. Our research relates to three strands of literature: the measurement and implications of bank efficiency (Chapter 2); the relation between

[7] As we experienced during the course of this research, the dearth of data, notwithstanding the creativity of researchers, is also one practical reason while banks have receive little attention, at least, in empirical studies.

information and the cost of equity capital (Chapter 3); the determinants of dividend policy (Chapter 2); and consequences of earnings quality (Chapter 3 & 4).

1.2.1 Information Risk and The Cost of Capital

Recently, research in accounting moved focus from issues relating to the determinants or drivers of accounting policy choices and disclosure to capital market implications of these choices. Whether disclosure policies and financial reporting affect firm cost of capital has become one of the most interesting questions in the accounting and finance literature (Beyer et al., 2010). Capital Asset Pricing Model (CAPM) and portfolio theory suggest a clear distinction between risks that are diversifiable and those that are not diversifiable. Specifically, the CAPM offers no role for information risk in establishing a firm's cost of capital as such risk is easily diversifiable. However, a number of theoretical and empirical studies suggest direct and/or indirect link between the cost of equity capital and the quantity/quality of accounting information. These studies have evolved along two streams: transaction cost and estimation risk explanations.

The first stream of studies links high cost of capital to low information stock because of the positive (negative) relation between bid-ask spreads (market liquidity) and information asymmetry. Theories along this line argue that greater disclosure reduces investor uncertainty and attracts greater long-term investment by investors: firms that disclose greater information that deliver greater returns to investors are able to attract long-term investors thus improving the marketability of their shares and lowering the cost of equity capital. Verrecchia (1983) and Dye (1985) show that greater disclosure of information increases the demand for stock of the disclosing firms leading to lower cost of capital. Benston (1986) and Fishman and Hagerty (1989) argue that greater disclosure of accounting information promotes better monitoring of managers, which improves market perception of managers of such firms leading to an increase in investor base thereby lowering the cost of capital.

Amihud and Mendelson (1986) provide the most prominent transaction cost based theoretical link between information and the cost of capital. The authors argue that the cost of equity capital is greater for securities with wider bid-ask spreads because investors require a higher return to compensate for the additional transaction costs resulting from information asymmetry. The release of additional information helps to reduce information asymmetry and allows firms to reduce the adverse selection component of the bid-ask spread and increase the liquidity of the shares, thereby reducing the cost of equity capital. Therefore, for Amihud and Mendelson (1986), the link between information and the cost

of capital exists because information reduces asymmetry information, resulting in the reduction of transaction costs and improvement in stock liquidity (see, also, Diamond, 1985; Diamond and Verrecchia, 1991; Lang and Lundholm, 1993).

The impact of differential information on equity betas and its implications on the cost of equity is the focus of the second stream of studies. These theoretical studies suggest that greater level of disclosure reduces the estimation risk associated with investor assessments of the parameters of an asset's return distributions. The argument goes that because investors' estimate of the parameters of a security's return distributions depends on publicly available information, investors perceive securities for which there is relatively less information as relatively more risky because of the uncertainty surrounding their returns parameters. Therefore, greater disclosure reduces the uncertainty and lowers the estimation risk (error) thereby reducing the cost of equity capital.

Seminal studies by Barry and Brown (1985) and Coles et al. (1995) use a Bayesian framework to compare two information environments with differential information structure. In one environment, information is available for all firms in the economy, whereas in the other information environment there are more observations for one group of firms than there are for another. The authors find that the traditional CAPM formula for market beta does not reflect estimation risk resulting in estimates of betas of the high information securities that are lower than they would be in the equal information case. Barry and Brown (1985) suggest that estimation risk, which may not be observable in returns data, is an additional element of risk that investors consider over and above the observable measures of risk. They argue that the possible existence of unobservable estimation risk might explain why small, less established low information firms seem to have higher average rates of returns than the large and well established high information firms as noted, for example, by Banz (1981) in the well-documented size effect.

However, Banz (1981) and Reinganum and Smith (1983) suggest that in well-diversified economies with many securities, estimation risk should be largely diversifiable. According to Reinganum and Smith (1983), estimation risk is inherently idiosyncratic and where securities with low information are a small part of a market index, idiosyncratic components have a correspondingly small influence on index variances and covariances. This argument contradicts Handa and Linn (1993), who argue that systematic components of estimation risk are potentially important, even in well-diversified economies. In view of the controversy, Clarkson et al. (1996) analytically explore the diversifiability of information effect. Using a Bayesian framework similar to that employed by Barry and Brown (1985), they conclude that the differential information effect should not be fully diversi-

fiable in most common settings but that its magnitude should vary considerably across firms. They predict that firms with more idiosyncratic components should also initially have higher beta risk and as a result, a greater rate of decline in beta as information increases.

Lambert et al. (2007) show that the quality of accounting information has a potential direct and indirect influence on the cost of capital. The direct effect, which is consistent with "estimation risk" paradigm, occurs because higher quality disclosure affect market participants' assessments of the distribution of the future cash flows, without having a direct impact on the cash flows per se. In addition, the quality of information exerts an indirect effect on cost of capital by affecting a firm's real decisions, which in turn influence its expected value and covariance of firm cash flow. While the authors suggest that accounting information may have a positive and negative relation with the cost of equity capital, they show that the effect of information on the cost of capital is not diversifiable and affects all firms. They conclude that higher information quality lowers market risk in the traditional CAPM framework resulting in the reduction of the cost of equity.

Relying on theoretical evidence that suggests a role for information in the determination of firm's cost of equity, however controversial, a number of empirical studies attempt to investigate whether this role is supported by data. In line with this, Botosan (1997), using a restrictive sample of 122 manufacturing firms, documents a negative association between the cost of equity capital and voluntary disclosure level for firms with low analyst following - firms with higher information asymmetry. However, she finds no association between these variables for firms with a high analyst following and for the full sample of firms. In view of limitations of the study by Botosan (1997), Botosan and Plumlee (2002) re-examine the link between the cost of equity capital and disclosure level using much larger sample. Contrary to expectation, they find that total disclosure is not associated with a lower cost of equity capital. However, when they examine, individually, the components of the total disclosure level they find that firms with a high analyst following benefit from providing greater annual report disclosure. On the other hand, and contrary to the prediction from theory, they find a strong positive and significant relation between the cost of equity and the level of timely disclosures, such as the quarterly report of shareholders. Finally, they find no association between the cost of capital and "investors relations" - presentation of analysis, company-sponsored field trip, and interviews. Botosan and Plumlee (2002) suggest that the positive relation between the cost of equity and timely disclosure, while inconsistent with theory, is consistent with

the concern of managers regarding the negative impact of timely disclosure (such as quarterly reports) on the cost of equity as high frequency of disclosure increases stock price volatility.

Poshakwale and Courtis (2005) extend the link between the cost of capital and disclosure level to the banking sector using a sample of 135 banks from Europe, North America, and Australia. The authors argue that higher level of voluntary disclosure lowers investor uncertainty and encourages investors to accept lower dividend payout. A lower dividend stream reduces the cost of capital because of a lower risk premium expected by investors. They argue that the lower cost of capital implies a lower cut-off rate that is applied in appraising potential projects thereby improving a firm's chances of accepting a higher number of profitable projects. Consistent with their prediction, controlling for cross-sectional variation in firm characteristics, they find a negative relation between their disclosure score and the cost of equity, measured as price to book value multiples. Our study provides a within-country investigation of the link between the cost of equity and bank financial reporting. However, unlike Poshakwale and Courtis, who investigate the role of disclosure level on the cost of equity, our study investigates the relation between quality of information, as measured by earnings quality, and bank cost of equity. In addition, we extend the study to examine the role of earnings quality on bank value and value relevance of bank earnings.

1.2.2 Dividend Policy: Theories and Evidence

Lintner (1956) pioneers modern academic empirical research on dividend policy. Lintner interviewed financial and other corporate officers of 28 US companies on factors that entered most actively into dividend decisions.[8] He reports that the primary question for many companies regarding their dividend decision was 'should the existing dividend be changed?' He notes that the relationship between current earnings and the existing dividend rate was the most important single factor determining the decision to change dividends and the amount of any change in dividends. Lintner (1956) reports that firms only increase their dividends when management believe there is a permanent increase in earnings, suggesting that a dividend increase implies a sustainability of the new level of dividends because of the sustainability and persistence of the current level of earnings.

In addition, Lintner (1956) reports that management exhibit an inherent resistance to change the level of dividends (inertia), concern for substantially increasing dividends (conservatism), and the belief that most stockholders prefer and put a premium on a

[8] See, also, Allen (1992) for evidence relating to the UK.

reasonable stable rate of dividends. Managers are also extremely reluctant to decrease the level of dividends, because they are concerned about sending negative information to the market. Lintner (1956) captures his findings with the now well-known partial adjustment model in which dividend change depends on current earnings, lagged dividends, and an adjustment factor, which is a function of management's conservatism and/or inertia about dividend change. Fama and Babiak (1968) apply the Lintner model to a sample of 392 US industrial firms for the period between 1947 to 1964 and provide strong support for many of the findings documented by Lintner (1956).[9]

Apart from the dividend smoothing behaviour uncovered by Lintner (1956), Allen and Michaely (2003) note five additional empirical observations that are the focal points in the discussion of dividend (payout) decisions. They show that large, established corporations typically pay out a significant percentage of their earnings in the form of dividends and repurchases and that dividends have been the predominant form of payout while share repurchases are increasingly becoming important (e.g. Grullon and Michaely, 2002). In addition, among firms traded on organized exchanges the proportion of dividend-paying firms has been steadily declining (e.g. Fama and French, 2001; Ferris et al., 2006).[10] Moreover, individuals in high tax brackets receive large amounts in cash dividend and pay substantial amounts of tax on dividends (e.g. Peterson et al., 1985). Finally, they also note that markets react positively to announcements of repurchase (e.g. Ikenberry et al., 1995; Grullon and Michaely, 2004) and dividend increases, including initiation (e.g. Pettit, 1972; Charest, 1978; Aharony and Swary, 1980; Michaely et al., 1995), and negatively to announcements of dividend decreases, including omission (e.g. Impson, 1997; Lie, 2005).

These stylised observations pointing to the importance of dividends are inconsistent with the dividends irrelevance theory of Miller and Modigliani (1961). In their seminal paper, Miller and Modigliani (1961) provide analytical arguments contradicting the hitherto received knowledge that shareholders preferred dividends by some unspecified multiples of earnings (e.g. Graham et al., 1961). According to this traditional position, all else equal, the more generous the dividend policy the higher the shareholders' wealth. Miller and Modigliani (1961) ask whether 'companies with generous distribution policies consistently

[9] Brittain (1964, 1966) and Brav et al. (2005) provide additional empirical support for the Lintner (1956) model.

[10] However, Julio and Ikenberry (2004) report that this pattern seems to have reversed in more recent years. In addition, DeAngelo et al. (2004) find no evidence indicating a reduction in dividends. They report that while the number of payers has reduced there has been a significant increase in nominal and real dividends because the increase in real dividends paid by firms at the top of the dividend distribution more than compensate for the reduction resulting from dividend omission by many small payers at the bottom of the distribution.

sell at a premium above those with niggardly payouts' and invoke the assumptions of the perfect market with rational investors and perfect certainty to prove that firm value is independent of dividend policy. This is so as a firm's dividend policy neither affects its cost of capital nor the total returns to its shareholders. They conclude that a firm's value is determined, only, by the quality of the firm's investments, as typified by the sequence of cash flows from operations, and not by the manner in which the net earnings are shared between dividends and retentions.

Recently, however, in a sequence of three studies DeAngelo and DeAngelo (2006, 2007, 2008) resuscitate the relevance-irrelevance debate by casting doubt on the current theoretical understanding of the irrelevance of dividend policy as advocated by Miller and Modigliani (1961). In the first of these papers, they argue that 'payout policy is not irrelevant and that investment policy is not the sole determinant of value, even in frictionless markets.' They provide analytical argument showing that the reason why payout policy is irrelevant in the Miller and Modigliani's framework is that the authors' assumptions reduce the feasible set to optimal choices by requiring firms to pay 100 percent of their free cash flow in every year, thus preventing niggardly distribution. DeAngelo and DeAngelo (2006) argue that if Miller and Modigliani's assumptions were modified to allow retention with NPV of investment policy fixed, a firm can reduce its value by paying less than full present value of free cash flows. They conclude that payout policy affects the wealth of the shareholders and its value relevance is not limited to the influence of project choice or to the effect of market imperfections, such as tax.[11]

In view of the influential theoretical paradigm suggesting no role for dividends in influencing firm value, and the tax disadvantage of dividends relative to capital gains in most jurisdictions, it must be perplexing that firms, including banks, have a preference to disgorge cash through dividends, while shareholders seem to respond favourably to announcements of dividend payments. Thus, the puzzle: why do companies pay dividends and why do shareholders seem to prefer dividends?

A good theory of dividends therefore is one that is able to explain as many of the patterns of dividends as possible. Financial economists have spent the greater part of the last five decades attempting to provide explanations for the observed patterns of dividends. The imperfections of the capital market are, expectedly, viable candidate explanations. While capital markets are imperfect because of (differential) tax, asymmetric information structure, agency problem, transaction cost, and regulations, the most influential

[11] However, see Handley (2008) for a criticism of the arguments and conclusions presented in the papers by DeAngelo and DeAngelo.

explanations for dividend payments relate mostly to the informational component.

The signalling explanation of dividends (Bhattacharya, 1979; John and Williams, 1985; Miller and Rock, 1985) suggest that managers have private information about the future cash flows of the firms and pay or increase (decrease) dividends in order to signal this private information to investors. Managers have an incentive to signal the private information when they believe that the company's stocks are currently undervalued. Given that payment of dividends is costly, dividends serve as a credible signal as other firms with less favourable inside information cannot mimic the dividend decision of a high quality dividend-paying firm without having to cut back on dividends in later years.[12] Thus, one implication of the dividend-signalling hypothesis is that stocks of firms that increase (decrease) dividends should experience positive (negative) price reaction as markets review their expectations about the prospect of the dividend announcing firms.

Bhattacharya (1979) pioneers the signalling explanation for dividends and the market reactions to dividends. He assumes that while markets are characterised by information asymmetry, managers nonetheless act in the interest of shareholders. He proposes a two-period model in which managers signal the quality of an investment project by committing to a dividend policy at time zero. Simultaneously at time zero, managers invest in a project about which they have private information relating to the project's quality, as measured by the expected profitability. The model assumes that if the payoffs from the project are not sufficient to maintain the committed dividends, the firm will cover any shortfall through outside financing and incur transaction costs in doing so. If the firm does indeed have good quality projects, it will usually be able to pay the dividends without resorting to outside finance and thus bears no transaction costs. Therefore, the transaction costs associated with external financing prevents firms with low quality projects from mimicking the dividend decision of firms with high quality projects. If dividends are high enough, the extra costs of assessing the market will more than offset the advantage from the higher share price received in time 1. As such, it would be unprofitable for the firm with poor quality project to mimic the dividend policy of the firm with good quality project.

Bhattacharya's (1979) model is successful in providing some explanations to some of the issues relating to the dividend conundrum. It explains the positive market reactions to dividend increase suggesting that investors are able to decipher the signal in management's dividend choices. It is also consistent with the payment of dividends notwith-

[12] For example, Asquith and Mullins Jr (1983) contend that dividend announcements are effective signals because they are "backed by hard, cold cash," or the lack of it.

standing the dividend-tax disadvantage relative to capital gain; dividends are desirable provided the dissipative (transaction) cost incurred in time zero is less than the benefit from a higher market value at time 1. However, his model fails to provide an explanation for management's use of dividends as signals when there are other less costly and equally effective alternatives, such as share repurchase (Vermaelen, 1981; Comment and Jarrell, 1991; Bartov, 1991) and debt (Ross, 1977). Thus, implicit in his model is the assumption that dividends and share repurchase are perfect substitutes. In addition, Bhattacharya's model fails to address the observed dividend smoothing behaviour of management.

Miller and Rock (1985) avoid the critical but less defensible assumption that managers commit to paying a known level of dividends that is the core of Bhattacharya's (1979) signalling model. The authors present a two-period model in which the private information relates to the level of firm's investments and the profitability of these investments. At time zero, a firm invests in a project whose cash flows are unobservable by investors. At time 1, the firm uses the cash flows generated by the project to finance dividend payments and new investments, both of which are unobservable by investors. Thus, according to Miller and Rock (1985), the opportunity cost of paying dividends is the lost investment opportunity, rather than the transaction cost put forward by Bhattacharya (1979). As the level of cash flows and investments are unobservable by the market, a bad firm may mimic the dividend policy of good firms by paying dividends and cutting down on its investments. However, a very high dividend level precludes such from happening without having an adverse effect on cash flows, investment level, and future dividends of the mimicking firms. Therefore, Miller and Rock's (1985) model provides an explanation for the large dividend payout observed in practice. It is also consistent with the positive reaction to dividend increase. But like Bhattacharya's (1979) model, their model fails to provide a convincing argument on why managers prefer the use of more costly dividend signal when other less costly signalling alternatives exist.

The premier implication of the dividend signalling models suggests a positive relation between dividend changes and future earnings changes. Watts (1973) provides the first empirical test of the relation between current dividends and future earnings. Using dividends and earnings data relating to 310 firms for the years 1946-67, the author tests the ability of current and past level of dividends and earnings to predict future earnings. He finds only weak evidence supporting the information content of dividends. While tests suggest that on average the relationship between future earnings changes and current unexpected dividend changes is positive, these tests also suggest that the average absolute size of the future earnings changes which is conveyed by unexpected dividend changes

is trivial. This conclusion is consistent with Penman (1983) who finds that there is not much information conveyed by dividend changes, after controlling for management's future earnings forecast (see, also, Gonedes, 1978).

However, Healy and Palepu (1988) report that firms that initiate dividend payments have positive earnings changes in the year before (mean 4.3%), the dividend announcement year (mean 5.5%), and two years after the dividend policy change (mean 2.2% and 3.5%, respectively) even after controlling for industry effect. For the dividend-omitting firms, Healy and Palepu (1988) show that, similar to dividend initiation, dividend omission follows significant changes in earnings. However, following dividend omission, omitting firms experienced two years of significant positive earnings changes, contrary to the prediction of the dividend signalling models. Benartzi et al. (1997) reinvestigate the issue using a much larger number of firms covering the period 1979-91. Consistent with Healy and Palepu (1988), they find a positive correlation between past and current earnings changes and dividend increases. Again, contrary to the dividend signalling prediction, they find no relation between future earnings changes and dividend changes. For dividend decreases, however their results support to a negative and significant relation between earnings changes and dividend changes in the two years following dividend cuts, consistent with Healy and Palepu (1988) for dividend omissions but contrary to the dividend signalling prediction.

Nissim and Ziv (2001) argue that earlier studies investigating the link between dividend changes and earnings changes report weak results because the regression models that they adopt are misspecified due to measurement error and omitted variable problems. After correcting for these econometrics issues by controlling for the expected change in future earnings, the authors find that dividend changes provide information about the level of profitability in subsequent years, incremental to market and accounting data. In support of the information content hypothesis, they also document a positive relation between dividend changes and earnings changes in each of the two subsequent years following dividend changes. However, their results are not symmetric for dividend increases and decreases. For their full sample, dividend increases are associated with future profitability for at least four years after the dividend changes whereas dividend decreases exhibit no relation with future profitability after controlling for current and expected profitability. They suggest that the lack of association between dividend decreases and future profitability is due to accounting conservatism.

Following the conflicting results presented by Benartzi et al. (1997) and Nissim and Ziv (2001), Benartzi et al. (2001) re-examine the relation between dividend changes and

earnings changes using the Fama and French (2000) modified partial adjustment model which controls for non-linearity occasioned by the mean reversing nature of earnings. They find no evidence that dividend changes contain information about future earnings changes.

The idea of a positive relation between dividend changes and stock price changes receives support in the literature. For example, Benartzi et al. (1997) show that a significant price increase (decrease) follows announcement of dividend increases (decreases). They find significant average abnormal returns of 0.81% (-2.5%) over a three-day event window following dividend increases (decreases). Bessler and Nohel (1996) investigate one of the implications of the dividend signalling models for banks. They hypothesise that the announcement effect of dividend reductions should be more severe for banks than for non-financial firms because bank customers may avoid financially weak institutions and discontinue the relationship on the release of negative information. To test their hypothesis, they investigate 81 dividend reductions for the period 1974-1991. Consistent with the signalling theory, they find significant abnormal returns of -8.02% for the two-day event window and -11.46% for a two-week period, correctly noting that these negative valuation effects are stronger relative to those reported in studies of dividend reductions by non-financial firms and other negative bank announcements. Their results underline the need for a separate treatment of banks and other regulated firms in empirical studies.

While the dividend signalling models give no guidance on the possibility of an information transfer from one firm to the other, another body of research documents the existence of intra-industry transfers of information where news about one firm is extrapolated to other companies in the same industry. Firth (1996) links the dividend signalling and the information transfer literatures. His result suggests that not only do dividends signal information about the announcing firms but that these signals also reflect on the stocks of similar firms within the same industry. Specifically, he reports significantly positive abnormal returns of 2.63% (0.37%) for dividend increasing (non-announcing) firms and significantly negative abnormal returns of -4.29% (-0.6%) for dividend decreasing (non-announcing) firms over a two-day event window. Bessler and Nohel (2000) extend this strand of studies to the banking industry. They test the idea of a contagion effect in bank stock returns stemming from announcements of dividend reductions by money-center banks. They investigate the possibility that a reduction in bank dividends signals information not only about the bank but also about other banks in the same industry. The authors find that non-announcing money-center banks suffer negative abnormal returns when rival money-center banks announce dividend cuts. They conclude that the

abnormal returns of non-announcing banks are systematically related to risks common to both announcing and non-announcing banks.

Allen and Michaely (2003) suggest that an ultimate test of the information content of dividends is one that considers the relation between the dissipative cost suggested by each of the dividend signalling models and the announcement effects of dividend changes. The role of (changes in) taxes on dividend changes is an important issue in this regard. Tax-based dividend signalling models suggest that managers use dividends to signal information about the firm because dividends are credible signals given that they are less tax efficient than share repurchases and are taxed higher than capital gains, in most tax jurisdictions. In line with this, Bernheim and Wantz (1995) use the opportunity provided by the change in dividend taxation in the US to investigate the effect of dividend taxation on share price response per dollar of dividends (bang-for-the-bucks).

The taxed-based dividend signalling theory suggests that given the tax disadvantage position of dividends, an increase in dividend taxation should increase the 'bang-for-the-bucks.' On the other hand, the agency-based free cash flow hypothesis suggest that an increase in dividend should decrease the bang-for-the-bucks since it is more expensive to pay dividends and the benefit is not likely to change when the taxes on dividends are relatively higher. Bernheim and Wantz (1995) present results that are consistent with dividend signalling hypothesis: the "bang-for-the-bucks" rises with dividend tax rate. However, other empirical studies do not seem to support this conclusion. For example, Grullon and Michaely (2001) investigate the difference in market reactions to dividend changes before and after the Tax Reform Act of 1986. They find that contrary to tax-based dividend signalling models, the market responded much more positively to dividend increases when dividend taxation was lower (see, also, Bernhardt et al., 2005).

The agency cost explanation for dividends has also received some limited theoretical and empirical support in the literature. Agency costs arise from the conflict of interest among corporate managers, shareholders, and bondholders. Jensen and Meckling (1976) suggest that company managers could overinvest by allocating resources to activities that benefit them even though such activities might not be in the best interest of shareholders. Grossman and Hart (1980), Easterbrook (1984), and Jensen (1986) suggest a partial solution to the agency problem between managers and equity holders. For example, Easterbrook (1984) provides two explanations for dividend payments that help to reduce the agency cost associated with the separation of ownership and control. First, he argues that for firms with dispersed ownership, individual investors have little incentives to monitor managers because the cost of such monitoring is overbearing at individual level while the

benefit is only marginal given the proportion of their holding in the firm. Payment of dividends encourages external financing through the capital market and subjects the firm to the monitoring devices and agents in the financial market, such as investment bankers, lawyers and public accountants. Second, payment of dividends may force managers to take value-enhancing actions they will normally avoid but which are in the interest of the shareholders, such as increasing the leverage of the firm.

Jensen (1986) argues that because perfect monitoring of managers is impossible, managers can choose actions that best serve their interests rather than the interests of the shareholders. In addition, he notes that cash is the asset that managers can misuse most easily. Managers with large free cash flows may use this cash in ways that are not in shareholders' best interest. Under these conditions, shareholders' best interests are served if free cash flows are disgorged rather than wasted on negative NPV projects. While increasing leverage with the resulting increases in routine interest payments is a way of reducing the amount of cash under management's control, Jensen's analysis implies that dividends benefit shareholders by extracting surplus cash from management control.

Lang and Litzenberger (1989) provide evidence in support of the free cash flow hypothesis. They show that the average return associated with announcements of large dividend changes is significantly larger for overinvesting firms (those with Tobin's Q less than unity) than for other firms consistent with the idea that markets react positively to dividend increases as such mitigate the overinvesting tendencies of managers. Thus, dividend changes by overinvesting firms signal information about changes in investment policies.

Consistent with the agency cost explanation of dividends, Born and Rimbey (1993) using a sample of industrial firms, find that dividend initiating firms that have engaged in some form of external financing during the previous twelve months generate larger abnormal returns. However, Noronha et al. (1996) present evidence that the agency cost rationale is context specific and that the agency cost explanation will not drive dividend payments if other mechanisms exist for controlling agency problem. Building on this argument, Filbeck and Mullineaux (1999) suggest that regulation of banks involves a context specific case where agency cost may be less relevant. They hypothesize that the presence of bank regulators as monitors may reduce agency cost to levels sufficiently small that third party monitoring by capital market institutions yields minimal benefits. Consistent with this hypothesis and in support of Noronha et al. (1996), they find no relation between abnormal returns associated with dividend announcements and their external financing activities. They conclude that monitoring activities of the capital

markets are not a rationale for dividend payment in the presence of bank regulation. They find support for an alternative explanation involving the signalling role of new equity financing.

Born (1988), in his study of a sample of 192 dividend initiations, show that differences in the magnitude of share price response to dividend initiations is explained by concentration of insider ownership. In a similar vein, Filbeck and Chadwell (1993) investigate the relation between concentration of insiders and the share price response to dividend changes implemented by bank holding companies. They hypothesise that the presence of regulatory monitors tempers the agency cost explanation to dividends, using the concentration of insider ownership variable. In support of the signalling theory, they find markets response significantly positively to dividend increases. However, their concentration of shareholders variable fails to successfully explain the differences in market reactions to dividend change announcements. They conclude that the degree of insider ownership does not validate the accuracy of a signal for firms in regulated industries as it does for those unregulated industries.

Collins et al. (2009) revisit the role of insiders on bank dividend policy. They examine the relationship between insider holdings and dividend policy (and debt). Using a sample of 65 banks in the US, they find that dividend payout is significantly and negatively related to insider holdings at lower levels of insider holdings while insider holdings are significantly and positively related to dividend payout at higher levels of insider holdings. That is, at lower level of insider holding, as insider holding increases dividend payout reduces, while at higher levels of insider holding, as insider holding increases dividend payout increases. Their results support a non-linear relation between insider holding and bank dividends.

Dickens et al. (2002) perform a horse race analysis of the factors explaining bank dividends. They adapt Barclay et al.'s (1995) model to study the relation between bank dividend policy and a set of seven factors: investment opportunities, capital adequacy, size, signalling, ownership, dividend history, and risk. Consistent with similar results for non-banking firms by Smith and Watts (1992), their empirical analysis suggests a negative relationship between dividend yield and investment opportunities, signalling, ownership, and risk and a positive relationship with size and dividend history. Theis and Dutta (2009) examine the robustness of the model using different sample period, sample firm, and data sources. They reexamine the Dickens et al. (2002) model of bank holding company dividend policy using a cross-sectional sample made up of 99 US firms. Their result shows that the original Dickens et al.'s (2002) model is robust, but not all

variables keep their significance. Specifically, they find a negative and significant relation for earnings volatility and size and a positive and significant relation for dividend history and risk (equity-to-assets). They find no support for the role of insider holding, future earnings, and investment opportunities. Furthermore, their results confirm the non-linear relation between dividend yield and insider ownership.

Using the opportunity afforded by the Tax Reform Act (1986), the Financial Institutions Reform, Recovery and Enforcement Act of 1989, and the FDIC Improvement Act of 1991, Casey and Dickens (2000) examine the effect of tax and regulatory changes on commercial bank dividend policy. They report a negative relation between tax rate and dividend payout - the lower the tax rate the higher the payout. This result is contrary to the dividend irrelevance conclusion. However, they are unable to establish a robust impact of changes in capitalisation requirements on dividend policy. In addition, their results show that bank dividend policy seems to be driven by factors other than those reported in the literature for industrial firms. Bank dividends exhibit no relation with past growth rates, beta, or an insider ownership variable that are important in such studies as Rozeff (1982) for industrial firms.

Using call report data, Niswander and Swanson (2000) consider whether a bank's level of capital, earnings, and taxes affect the discretionary portion of four management choices, including dividends. For discretionary dividends, they find no systematic relation between capital level and dividends for below-threshold banks, possibly because most of these banks pay little or no dividends. For banks above the capital threshold, however, they find that as capital level increases, public banks increase dividend payout more than private banks suggesting that private banks may be retaining funds to minimize the personal tax payments of their owners and/or to increase bank capital. These results underline the importance of regulations and regulatory capital in the choice management of private and public banks make regarding dividend policy.

Mercado-Mendez and Willey (1995) examine the agency cost explanation of dividends by analysing the effect of four variables that proxy for agency cost on three financial policy variables, including dividend yield, for a sample of 104 largest US banks. Their proxies for agency cost are earnings volatility, managers' portfolio diversification losses, bank size, and standard deviation of bank equity returns. They find evidence in support of bank size and a measure of manager's portfolio diversification opportunity set as factors affecting bank dividends. Boldin and Leggett (1995) examine the relation between bank dividend policy and bank quality rating. Using an ordered probit response model, their results show a positive relationship between quality and dividends per share, In addition, they

find an inverse relation between quality and dividend payout ratio. They conclude that these results are consistent with management's use of dividends to signal information about bank quality in terms of its soundness or risk.

In summary, studies focusing on banking and non-banking firms attempt to test different explanations for dividends without a consensus. While this thesis does not advance a new explanation for the puzzling dividend phenomenon it, in part, re-examines the relation between bank dividends and changes in bank overinvestment problem, using measures derived from a frontier analysis of banks.

1.3 Summary of Thesis and Central Findings

This doctoral thesis addresses the implications of two bank characteristics - bank efficiency and bank earnings quality - for bank dividend policy and specified capital market consequences, including the cost of capital, bank valuation, and value relevance of earnings. Using Data Envelopment Analysis (DEA), Essay 1 investigates the role of bank efficiency in market assessment of dividend change announcements by banks. Essay 2 examines market implications of bank earnings quality. It relates bank earnings quality to bank cost of capital, bank valuation, and value relevance of earnings. Finally, Essay 3 examines the results of a cross-country study of the role of bank earnings quality on dividend policy of banks and the dividend-earnings relation.

1.3.1 Essay 1: Bank Efficiency and Market Reactions to Dividend Change Announcements

Numerous studies attempt to explain the stylised significant market reactions to dividend changes. However, to date, only a few of these studies examine this relation in the context of the banking firm. In addition, while a limited number of studies link firm efficiency to capital structure decisions, we are unaware of any study that establishes a link between dividend policy and firm efficiency. In Essay 1 of this thesis, we explore the potential relation between bank efficiency and abnormal returns following dividend change announcements.

We estimate bank overinvestment problem using changes in bank efficiency derived from a frontier analysis of bank input-output combinations. Drawing motivation from both the dividend signalling and agency cost explanations of dividends, as well as extant empirical evidence linking firm efficiency to stock prices, we examine the possibility that dividend changes signal changes in bank overinvestment problem, as measured by

changes in bank efficiency. Consistent with extant literature, we find significantly positive abnormal returns following dividend change announcements suggesting that markets seem to respond to the information content of bank dividends, whatever it is.

Using the efficiency scores derived from data envelopment analysis (DEA), consistent with our hypothesis, we find that improvement in bank overinvestment problem is significantly and positively associated with market reactions following dividend increases. Markets seem to interpret an increase in dividends by inefficient banks as a signal of an improvement the announcing bank overinvestment problem. This result supports the idea that banks disgorge dividends to reduce excess inputs, consistent with the agency explanation of dividends. However, consistent with the moderating role of bank regulation, we find no support for the role of changes in bank efficiency in market reactions to dividend decreases.

1.3.2 Essay 2: Market Rewards Associated with Bank Earnings Quality

In view of the prevalence of bank failures, investors, regulators, and academics have called for better quality earnings from banks. Regulatory initiatives have aimed at reducing the incidence of bank failure by improving the quality of earnings. However, these regulatory requirements, such as those contained in the Federal Deposit Insurance Corporation Improvement Act of 1991 and Sarbanes-Oxley Act of 2002 are associated with predicted and unintended costs. A number of studies, (for example, Altamuro and Beatty, 2010), investigate whether introduction of regulations are followed by improvement in the financial reporting quality of banks. However, one question that remains unanswered in the literature is whether markets reward banks with better financial information. Essay 2 of the thesis provides an answer to this question.

Specifically, Chapter 3 of this study investigates a number of economic consequences of bank earnings quality. We draw motivation from the argument suggesting a role of accounting information in capital markets. Theoretical studies on this issue suggest that the quantity and quality of information affect the cost of capital. We investigate whether higher earnings quality is associated with lower cost of equity as predicted by theory. In addition, because stock value is a function of firm cost of capital, we argue that if earnings quality matters and results in lower cost of equity for banks, its impact should also reflect in bank valuation and market valuation of earnings. In line with this argument, we investigate the relation between bank earnings quality and bank valuation as well as market valuation of earnings.

Using various earnings quality measures, the study finds that banks with better earnings

quality, as measured by an aggregate earnings quality variable, experience lower cost of equity capital. Consistent with this primary finding, our results also support the idea that banks with higher earnings quality enjoy higher market valuation and higher price-earnings multiples compared to banks with lower earnings quality.

Overall, our results suggest that markets can differentiate between "good" and "bad" earnings and seem to compensate banks with better earnings quality. Consistent with this result, we argue that earnings quality, in addition to the levels of earnings, should be an important ingredient in the governance of banks. However, we also caution that the relation between the cost of equity and individual dimensions of our aggregate earnings quality measure is not uni-directional as some earnings attributes exhibit significant and positive relation with bank cost of equity.

1.3.3 Essay 3: Earnings Quality and Bank Dividends

While the surveys by Lintner (1956) and Brav et al. (2005) suggest that managers are concerned about the sustainability of the level of earnings in setting the level of dividend change, the importance of earnings quality in payout policy has received little attention in empirical studies. Essay 3 of this thesis provides cross-country evidence on the link between bank earnings quality and dividend payout.

We contribute to the literature by first constructing a country-specific index of bank earnings quality that incorporates various dimensions of earnings quality. We show that our index of earnings quality correlates strongly and in the expected direction with country-specific measures of transparency and opacity. Using the index of bank earnings quality, we investigate the relation between earnings and bank dividend payout. We extend the study by examining whether the dividend-earnings relation depends on earnings quality. Consistent with our first hypothesis, we find that banks in countries with high earnings quality pay a greater proportion of their earnings, revenue, equity, assets, and cash flows in dividends. This result is robust to a number of institutional and bank-specific variables, and the potential endogeneity of earnings quality.

In addition, while banks around the world seem to follow the traditional dividend smoothing policy, consistent with our second hypothesis, our results show that the dividend-earnings link is stronger for banks in countries with high earnings quality. This finding supports the idea that earnings of banks in these countries are more sustainable and managers are quicker in incorporating them into dividends.

2 Bank Efficiency and Market Reactions to Dividend Change Announcements

Abstract

We examine if there is a relation between market reactions to bank dividend changes and changes in bank overinvestment problem, measured as the change in the level of bank efficiency, derived from the frontier analysis of input-output correspondence of dividend announcing and non-announcing banks. Consistent with the agency-based explanation of dividends and empirical studies linking firm efficiency to (changes in) share price, our study establishes a link between changes in share price around dividend announcements and changes in bank efficiency. We find that improvement in bank overinvestment problem is significantly and positively associated with market reactions following dividend increases. The result suggests that banks announce a change in dividends to signal that they will not waste their resources. In addition, our study fails to rule out the cash flow signalling and dividend clientele explanations for market reactions to announcements of dividend increases. Consistent with these theories, we find significantly positive relation between market reactions to dividend increases and the magnitude of dividend change as well as anticipated dividend yield. However, consistent with the moderating role of bank regulation, we find no support for the role of changes in bank efficiency in market reactions to dividend decreases.

2.1 Introduction

Why and when do firms pay dividends? Miller and Modigliani (1961) show that under a perfect market, with rational investors and perfect certainty, dividend policy is irrelevant to market valuation of firms. However, anecdotal and empirical evidence show that announcements of dividend changes affect firm value as markets respond favourably

(unfavourably) to dividend increases (dividend decreases).[1] Miller and Modigliani (1961) suggest that this phenomenon is not inconsistent with the irrelevance of dividends but consistent with the information content of dividends - the idea that investors react to the information contained in the change in dividends rather than to the actual dividend payments. Two explanations for this observed phenomenon stand out among the competing candidates: the cash flow signalling hypothesis and the free cash flow hypothesis.[2]

The cash flow signalling hypothesis builds on the theoretical evidence suggesting that dividends or a change in dividends signal information about changes in the announcing firm's current and/or future earnings. Relying on the notion of asymmetric information between managers and shareholders, Bhattacharya (1979), Miller and Rock (1985), and John and Williams (1985) suggest that dividend changes are explicit signals about current and/or future earnings prospect. Dividends are attractive choice of signal because of their dissipative costs, such as lost investment opportunities and taxes that make the payment of (large) dividends less attractive to mimic by less valuable firms. For example, Miller and Rock, using the sources and uses of funds identity, show that dividend decision could reveal information about current earnings to the market.

However, the cash flow signalling hypothesis only receives a weak support from empirical studies by Watts (1973) and Gonedes (1978), who find a tenuous link between dividends and subsequent earnings. The authors show that dividends reflects no additional information beyond that reflected in contemporaneous or past income signals. While, Ofer and Thakor (1987) find that the knowledge of dividend announcements improves the accuracy of the average analyst's pre-announcement forecasts of future earnings, more recent studies by Benartzi et al. (1997), Benartzi et al. (2001), Grullon et al. (2002), and Grullon et al. (2005) show that the cash flow signalling theory (still) plays little or no role in explaining market reactions to dividends.

The free cash flow explanation, which draws on the broader agency cost theory (Jensen, 1986), argues that firms with excess cash flow and poor investment opportunities face agency cost and use dividends to distribute the excess cash to shareholders in order to minimise wasteful investment and mitigate agency problems. Therefore, if managers are overinvesting, an increase in dividends will reduce the overinvestment problem and ceteris paribus, results in an increase the market value of the firm. Similarly, a dividend decrease signals that managers will continue to invest in wasteful projects resulting in a loss in shareholder value. The positive relation between market reactions and the sign of the

[1] See, for example, Pettit (1972), Aharony and Swary (1980), Bajaj and Vijh (1990), and Bessler and Nohel (1996).

[2] The dividend clientele effect also enjoys some limited support in the literature.

dividend change is consistent with the idea of efficient markets. Markets understand the dividend signal and react positively (negatively) to dividend increasing (dividend decreasing) firms with poor investment opportunities. Lang and Litzenberger (1989) find support for the free cash hypothesis against the alternative cash flow signalling hypothesis. However, Denis et al. (1994) re-examine the question and find no support that the free cash flow hypothesis explains the market reactions to dividend change announcements.

This study examines whether bank dividend changes provide information about changes in bank overinvestment problem by examining the relation between stock market reactions to dividend changes and changes in bank efficiency, derived from frontier analysis of bank input-output combinations. Specifically, our study provides evidence on the dividend question by investigating whether change in stock prices following dividend change announcements reflect changes in bank efficiency. While our study definitely speaks to the age-old question on dividends and information content of dividends, we nonetheless contribute to this strand of literature in many ways.

First, while dividend policy and, in particular, the information content of dividends of industrial firms enjoy a considerable attention in the literature, there is little evidence on bank dividend policy and bank signalling through dividends. For example, while Bessler and Nohel (2000) provide evidence of significant market reactions following bank dividend announcements, their sample is limited to only 49 money-center and regional banks. In addition, their study examines the contagion effect of changes in the quality of bank loan portfolios and does not investigate the validity of competing explanations of market reactions to dividends. Even though the study period also differs from those covered in other studies, the core of our contribution relates to the characterisation of bank quality, in particular, the overinvestment problem. While studies such as Lang and Litzenberger (1989) distinguish between overinvesting and optimising firms using Tobin's Q ratio, our study distinguishes between banks using efficiency scores derived from a frontier analysis of bank technical and profit efficiencies. Therefore, we provide an innovative way to look at the dividend problem and avoid one of the weaknesses of the Tobin's Q measure relating to the potential influences of non-performance related factors, such as market misvaluation.

While frontier efficiency methods are widely used in economics literature and in studies relating to the efficiency of banks and insurance companies, our study relates to studies investigating the implications of firm efficiency. A common trend in these studies is the conclusion that the stock prices reflect efficiency scores obtained from different frontier models. This is not surprising given that the inputs and outputs data that enter the

efficiency models are in public domain. However, the study by Berger and Bonaccorsi di Patti (2006), who use a frontier approach to investigate the implication of agency cost for bank capital structure, primarily motivates our study. Our study extends this relatively new strand of research by investigating the relation between dividend changes and bank efficiency, our measure of bank overinvestment problem. We restrict our investigation to the demand side of the problem by investigating the relation between market reactions to dividend changes and changes in bank efficiency.

Using the standard event study methodology, we first estimate the abnormal returns following announcements of dividend changes by our sample of US banking firms. Consistent with evidence in the literature, we find strong support for a positive relation between the sign of dividend changes and market reactions to dividends: we find significantly positive (negative) abnormal returns and cumulative abnormal returns following dividend increases (dividend decreases). However, the magnitude of market reactions is comparatively lower than that reported for non-financial firms suggesting that the peculiar characteristics of banking firms or perhaps their regulatory and supervisory environment temper the potential role of dividends. Using data envelopment analysis, we obtain yearly measures of technical and profit efficiencies from 1998–2007 for a panel of 310 US banking firms. We then relate changes in bank agency problem, measured as the yearly changes in efficiency to market reactions following dividend change announcements. After controlling for the size of the dividend change, the anticipated dividend yield, and bank size, we find, as hypothesised, a significant positive relation between changes in bank efficiency and share price reactions to announcements of dividend increases. Thus, changes in bank dividends seem to reflect changes in the quality of management investment policies. However, our study finds no support for the role of bank efficiency in market valuation following dividend decreases.

The remainder of the chapter is organised as follows. Section 2.2 presents and discusses the main research hypothesis tested in the study. Section 2.3 discusses the methodology of the study, including the event study methodology and the frontier analysis that the study uses in characterising bank efficiency and overinvestment problem. Section 2.4 presents and discusses the empirical results and Section 2.5 concludes the chapter and discusses the policy implications for banks.

2.2 Conceptual Framework and Hypothesis Development

The agency based free cash flow hypothesis argues that firms with substantial free cash flows are more likely to invest in negative net present value projects or waste them on organisational inefficiencies rather than distribute them to shareholders (Jensen, 1986). Jensen's free cash flow hypothesis predicts a significant valuation effect for signals of changes in wasteful investments for firms with poor investment opportunities or those characterised by organisational inefficiencies. Lang and Litzenberger (1989) argue that these firms are reluctant to subject negative net present value projects to the monitoring associated with external financing. Therefore, announcements of dividend changes by overinvesting firms reflect management's chosen course of action regarding its future investment policy. Specifically, an increase in dividends mitigates the overinvestment problem and increases the market value of the firm as markets adjust their expectation about the outcome of the overinvestment problem. Conversely, markets react negatively to a reduction in dividends by overinvesting firms as this sends a signal that management would continue in the path of overinvestment. While bank regulation, aimed at mitigating the potential agency problem associated with banks, may suggest a weak monitoring role for external financing and dividends, evidence and the recurring banking crisis also suggest that regulation is not a perfect substitute for capital market monitoring. In fact, evidence suggests that regulatory efforts, such as the deposit insurance schemes, are associated with other unintended agency problems, suggesting a potential role for market monitoring of banks.[3]

The agency cost theory is pervasive in finance and accounting, in particular, as an explanation for firms' capital structure and dividend decisions. However, Berger and Bonaccorsi di Patti (2006) note that the inconclusive evidence regarding the role of agency cost in capital structure may be due to the problem of measurement. They argue that the lack of convincing evidence on the direction of the relationship "could be partly explained by the intrinsic difficulty in defining a measure of performance that is close to the theoretical definition of agency costs." In line with their argument, we conjecture that the inability to find consistent empirical evidence in support of the role of agency cost in explaining market reactions to dividends or further distinguishing this explanation from the competing cash flow signalling explanation may also be due to the problem of measurement. For example, Lang and Litzenberger (1989) adopt the Tobin's Q ratio that incorporates both accounting and market data in the investigation of cash flow signalling

[3]See Chapter one of this thesis for further discussion of this issue.

and free cash flow hypotheses as explanations for market reactions to dividends. They find support for the role of the latter but not the former. However, Denis et al. (1994) use similar measure for their study of dividend change announcements for a sample of 6777 US firms and find no support for the free cash flow hypothesis. One potential problem with the use of Tobin's Q ratio is that it relies on stock prices and thus incorporates any potential misvaluation of shares and exogenous variables, which are outside the control of management and thus may not reliably reflect the agency problem faced by firms.

Recent empirical evidence also suggests that markets incorporate the level and changes in firm efficiency in the assessment of market value of firms. For example, Nguyen and Swanson (2009) develop a simple model that relates firm inefficiency to expected returns. They argue that in an efficient market with rational expectation market prices and stock returns should reflect firm efficiency, such as agency problem and financial distress. They provide evidence that firm efficiency exhibits significant explanatory power for average equity stock returns and further suggest that an (in)efficiency factor be incorporated in asset pricing models.

Alam and Sickles (1998) investigate the relation between stock market returns and changes in technical efficiency in the US airline industry and find a significantly positive relation between these variables. Consistent with this result, Eisenbeis et al. (1999) find that the stock returns of US bank holding companies are a decreasing function of cost inefficiency. In addition, Kohers et al. (2000) find that abnormal returns for US bank holding companies engaged in merger and acquisitions are positively related to (the target's) X-efficiency as well as the difference in bidder/target efficiencies relative to their peer group (see, also, Wu and Ray, 2005; Cummins and Xie, 2009). Fiordelisi (2007) shows that banks lose around one-third of potential shareholder value due to inefficiency. Finally, the relation between firm efficiency and stock prices is not limited to the US. For example Chu and Lim (1998) analyse six publicly traded Singaporean banks and find that changes in stock prices are positively related to changes in profit efficiency but not related to changes in cost efficiency (see, also, Kirkwood and Nahm, 2006).

Our bank efficiency score that we obtain from a data envelopment analysis of banks provides a simple, yet direct, measure of management use of firm resources to generate desired outputs, relative to the best firm(s) in the same industry. Stigler (1976) first suggests the conceptual link between (productive) efficiency and agency cost. Later studies show that firms that seem profitable relative to other firms in the same industry are not necessarily efficient in applying resources to generate optimal outputs. For example, Sherman and Zhu (2006) note that studies of benchmarking practices with frontier ana-

lysis, such as DEA have identified resources inefficiencies in some of the most profitable firms.

Frontier analysis evaluates how close a firm is to the best-practice firm facing similar exogenous conditions and utilising similar inputs to produce similar outputs. We argue that the performance of a best-practice firm under the same exogenous conditions is a reasonable benchmark for the expected performance of the firm if agency costs were at their minimum level. While agency problem would not fully explain the differences in efficiency among firms and while all banks are likely to face some level of agency cost, we argue that inefficient banks are more likely to exhibit higher overinvestment problem that suggests a role for dividends. Managers of inefficient banks are more likely to engage in excessive consumption of perquisites (expense preference behaviour) that increases the inputs of the firm while at best producing the same level of outputs.

The effect of this preference behaviour is the reduction in the efficiency of the firm relative to the value maximising bank. Management of inefficient banks may signal any improvement in the level of efficiency or a desire for a change of course of action by increasing the level of dividends. Similarly, a reduction in the level of dividends signifies management's desire to continue or exacerbate the agency problem. Either way, in an efficient market, we expect a positive (negative) market reaction to the "efficiency news" contained in the dividend increase (dividend decrease). Therefore, if resolution of the agency problem motivates bank dividend payments, we would expect less efficient banks that are characterised by high agency problem to increase their level of efficiency by reducing their inputs, for example, by disgorging excess cash through higher dividends.

The above discussion suggests the main hypothesis tested in this study stated in its alternative form:

H1: There is a positive (negative) relation between change in bank efficiency and market response to dividend increases (decreases)

2.3 Methodology

2.3.1 Data and Sample Construction

We obtain financial data for the construction of our sample and research variables from Compustat Bank database. While the choice of the banking industry is consistent with the general focus of this thesis, restricting the sample to banks ensures the homogeneity of the sample. In addition, the data envelopment analysis that we use in the measurement

of bank efficiency does not lend itself to cross-industry studies as it assumes that firms included in the model use similar inputs and generate similar outputs. In view of the fact that efficiency scores are, by definition, relative measures of efficiency, in the first stage of sampling, we require that banks must have data to calculate efficiency score for each year of the study. For this reason, we restrict our study to a ten-year period starting 1998 and ending 2007 for which the greatest number of banks are included in the frontier analysis.[4] This procedure produces 310 banks resulting in 3100 bank-year observations on bank efficiency scores.[5]

To be included in the sample of dividend change announcements the dividend distribution and the bank to which it relates must meet the following conditions:

1. The bank's returns data needed to estimate abnormal returns are sufficiently available in CRSP. To mitigate the problem of nonsynchronous trading, we require that price and returns data are available for a minimum of 70% in a 90-day estimation window. In addition, the price and returns data in respect of the dividend announcing bank must also be available for all days in the 21-day event window.

2. The distribution is a quarterly taxable cash dividend in US dollars. We identify all dividend announcement dates and the dividend amounts from CRSP database (CRSP code 1232). Following Watts (1973) and Nissim and Ziv (2001), we allocate each dividend observation to a particular year if the current dividend was declared in the second, third, or fourth fiscal quarter of the year, or in the first quarter of the following year. This ensures that our accounting data are appropriately matched with the dividend announcement and stock data. Unlike similar studies on industrial firms, we do not set a cut-off rate for the dividend change included in the sample. This is because, as Filbeck and Mullineaux (1993) argue, dividend payment is a form of certification by regulatory authorities of the quality of earnings

[4] We were faced with the choice of increasing the sample size by reducing the number of input and output variables that enter our efficiency models or reducing the sample size by using more ideal models that incorporate more input and output variables. As the validity of our results, no matter the sample size, depends on our ability to better differentiate among banks based on their efficiency level, we decide to sacrifice larger sample size for more ideal models. In addition, going further backward in time reduces the number of bank (and bank-years) in the sample for which multiple input and output variables are available. Finally, we restrict the study to 2007 in order to circumvent the impact of the recent bank-related economic crisis that may have an impact on otherwise efficient banks.

[5] Normally, by assumption, the DEA methodology requires that the efficient frontier is generated using all firms in a particular industry. Our study is limited in this regard because the Compustat Bank database that we use is restricted to publicly listed banks. While we are aware of other bank databases, they are not as adequate as Compustat Bank. In addition, combining databases was not a feasible option.

of the announcing bank such that even a small change in dividends could signal information to the market.

3. The previous announcement dividend date occurs within a window of 90 trading days prior to the current dividend announcement date. That is, we require that not more than one dividend announcement event occurs in a single quarter and that a previous dividend amount is available to calculate the change in dividends.

4. The dividend announcement is not in respect of dividend initiation or omission. We exclude dividend omission because CRSP does not indicate the dividend omission announcement dates. In addition to the reason given in 3 above, we exclude announcements of dividend initiation because evidence suggests that the price reactions to these announcements are significantly larger than dividend increases (see, for example, Healy and Palepu, 1988).

5. A major difficulty in assessing information content of dividends lies in the potential contamination of the dividend announcement effect by other price relevant news. To mitigate the impact of other news on stock prices, we exclude any dividend announcement for which there are also confounding events, such as merger, stock dividends, and earnings announcements, occurring within 3 trading days surrounding the dividend announcement dates. We obtain announcement dates for mergers, stock dividends, and earnings from Reuters 3000 Xtra.

This procedure produces our initial sample of 1182 dividend change announcements for the 10 year sample period. This consists of 995 dividend increases and 187 dividend increases. The large percentage of dividend increases relative to dividend decreases in the sample is consistent with the observed reluctance to cut dividends (e.g. Lintner, 1956) and other empirical studies (e.g. Li and Lie, 2006). We assume that dividends follow a random walk and use dividend change as our proxy for the unexpected change in dividends. We define dividend change (DIVCHG) as the (signed) change in the cash dividends relative to the previous period dividends (i.e. quarter $t-1$).[6]

2.3.2 Event Study Methodology

We estimate the market valuation of dividend change announcements using event study methodology (Fama et al., 1969). The usefulness of event studies arises from the fact that the magnitude of abnormal returns at the time of an event provides a measure of the

[6]Yoon and Stark (1995) use similar measure of unexpected dividend change.

unanticipated impact of the event on the wealth of the firm's shareholders (Kothari and Warner, 2007). We estimate wealth effect of dividend change announcement using the residual analysis in which the abnormal returns around dividend change announcement dates are obtained as the difference between observed stock returns (R_{it}) and expected stock returns $(E(R_{it}))$. We assume that the market model adequately captures bank returns generating process:[7]

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{2.3.1}$$

where R_{it} is the continuously compounded returns on stock i on day t;[8] R_{mt} is the value weighted returns on the market portfolio; [9] α_i and β_i are the parameter estimates of the market model for stock ith, estimated over a 90-day window; ε_{it} is the residual for stock i on day t and represents the unexpected returns for stock i.

Cowan (1992) argues that thin trading makes the violation of parametric tests more likely. If securities are thinly traded, applying ordinary least squares (OLS) to the time series returns data results in biased parameter estimates of the market model due to serial correlation that is induced by thin trading. This bias occurs because returns are measured with error that is correlated with the market index (Scholes and Williams, 1977; Fowler et al., 1980; Dimson, 1979). Scholes and Williams (1977) show that the parameters of the market model are unattractive under condition of nonsynchronous trading. To the extent that the security is more (less) thinly traded than the market index, beta estimates are biased downward (upward). To account for the potential bias of the OLS beta, we use the Scholes and Williams (1977) beta in the estimations of abnormal returns.

We initially consider a full event window of 21 days defined as the 10 days before and 10 days after the announcement period centred on day 0, the announcement day identified in the CRSP database. However, our regression model relates the 3-day announcement period cumulative abnormal returns to change in efficiency and other control variables. We include the one day before and one day after the announcement in the announcement period because the abnormal returns on these days are, generally, significantly different

[7] Many authors argue for the inclusion of an interest rate variable based on the premise that bank stock returns and cost are directly dependent on interest rate (e.g. Stone, 1974; Choi et al., 1992). However, Lloyds and Shick (1977) report that the inclusion of bond index leads only to a marginal increase in explanatory power over the market model (see, also, Bessler and Nohel, 1996, 2000).

[8] We use continuously compounded returns as Fama (1976, 17-20) argues that continuously compounded returns conform better to the normality assumption underlying regressions (see, also, Strong, 1992). However, Brown and Warner (1985) report similar results using simple and continuously compounded returns.

[9] Using equally weighted returns produces similar results.

from zero, suggesting that they contain valuable information. We estimate the abnormal returns (ar_{it}) on event day t for stock i as the out-of-sample residual of the above market model. That is:[10]

$$ar_{it} = R_{it} - E(R_{it}) \tag{2.3.3}$$

all variables are as earlier defined.

Empirical evidence suggests that announcements of dividends induce variance increases in the distribution of event period returns. Brown and Warner (1985) show that increases in variances due to events cause standard parametric tests to report a price reaction more often than expected leading to the frequent rejection of the null hypothesis of zero abnormal returns. Harrington and Shrider (2009) argue that all events induce variance and suggest tests of significance of abnormal returns that are robust to cross-sectional variation. They advocate that the BMP - Boehmer et al.'s (1991) - approach, which compensates for the potential event induced variance by incorporating a simple cross-sectional variance adjustment, is robust to the impact of heteroscedasticity of returns. This approach also ensures that tests are robust to the impact of calendar and industrial clustering, as our sample includes a single industry with many banks that announce their dividends almost at the same time (see, for example, Bessler and Nohel, 2000).

Accordingly, we calculate standardised abnormal returns (AR_{it}) as the ratio of (un-standardised) abnormal returns (ar_{it}) to the standardisation factor s_i, where $s_i = \hat{s}_i[(1 + 1/T_i + ((R_{me} - \bar{R}_m)^2 / \sum_{s=1}^{T}(R_{mt} - \bar{R}_m)))]^{0.5}$ and $\hat{s}$ is stock $i's$ estimated standard deviation of abnormal returns from the estimation period ($t \in [-100, -11]$, R_{me} is the market returns during the estimation period, and T is the total number of days in the estimation period (90 days).

Thus, the test statistic that we use to analyse the statistical significance of the standardised abnormal returns is given by:

$$(1/N)\sum_{n=1}^{N} AR_{it} \Big/ \left[(1/N(N-1))\sum_{n=1}^{N}(AR_{it} - (1/N)\sum_{n=1}^{N} AR_{it})^2\right]^{0.5}$$

where N is the total number of events (dividend increases or dividend decreases) in the sample. In effect, the Boehmer et al.'s (1991) approach assumes that event-induced variance is proportional for each firm.

[10] That is,

$$ar_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \tag{2.3.2}$$

where $\hat{\alpha}$ and $\hat{\beta}$ are the estimated parameters of the market model.

Parametric tests of abnormal returns, including that presented above, rely on the assumption of normality. However, Fama (1976, Ch. 1) notes that, compared to monthly stock returns, daily stock returns deviate from the normality assumption (see, also, Brown and Warner, 1985; Cowan, 1992). In addition, even though the parametric test that we use mitigates the impact of variance increase, other factors, such as outliers, may result in potential misspecification of our test. We provide a robustness check of our test of the null hypothesis of zero (cumulative) abnormal returns using the generalised sign test (GST) originally developed by Corrado (1989) and extended by Cowan (1992). The generalised sign test examines whether the number of events with positive cumulative abnormal returns exceeds the number expected in the absence of abnormal performance.

2.3.3 Estimation of Bank Efficiency

Frontier analysis, which comes in two variants, measures how close a decision making unit (DMU) is to the 'best practice.' The parametric variant, such as the stochastic frontier analysis, involves an econometric estimation of a pre-specified stochastic production, cost, or profit function. We use a non-parametric frontier methodology - data envelopment analysis (DEA). DEA generates a frontier line that designates the performance of the best decision making units and measures the efficiency of other units by deviation from the frontier. Compared to the traditional ratios used in the measurement of firm performance, its appeals rest on its ability to combine many variables. Unlike alternative frontier approaches, DEA also appeals to empirical studies as it produces efficiency estimates without a priori functional restrictions on the underlying functional form. Hence, the resulting efficiency measures do not suffer from the potential misspecification of the functional form.[11] At the heart of DEA lies the condition of Pareto optimality under which a DMU is efficient if it is impossible to raise output without raising any of the inputs and without lowering any other output. Similarly, a DMU is not efficient if it is possible to lower an input without decreasing any of the outputs and without increasing any other input.

DEA uses a linear programming technique for the estimation of efficient frontier and measurements of efficiency scores relative to the resulting efficient frontier (Charnes et al., 1978). The efficient frontier, which is made up of decision making units is constructed through a piece-wise linear combination of input-output correspondence set that envelops the input-output correspondence of all DMUs in the sample (Thanassoulis, 2001). A

[11] However, DEA is also criticised for assuming non-existence of measurement error and statistical noise (see, for example, Das and Ghosh, 2006)

production frontier indicates the minimum inputs required to produce any given level of outputs for a firm operating with full efficiency. For example, consider N banks (DMUs) each producing m different outputs using n different inputs. We measure the efficiency of the DMUs as follows:[12]

$$E_s = \frac{\sum_{r=1}^{s} u_r y_r}{\sum_{i=1}^{m} v_i x_i} \tag{2.3.4}$$

where y_r is the amount of output r produced by the sth DMU; u_r is the weight assigned to output r, x_i is the amount of input i used by the mth DMU; v_i is the weight assigned to input i. While these weights may be fixed in advance, we derived them automatically during the estimation of the DEA model.

The efficiency ratio (E_s) in Equation 2.3.4 is then maximised subject to the following:

$$E_s = \frac{\sum_{r=1}^{s} u_r y_r}{\sum_{i=1}^{m} v_i x_i} \leq 1, \qquad j = 1, ..., n \tag{2.3.5}$$

$$u_r, v_i \geq 0. \qquad \forall_{r,i} \tag{2.3.6}$$

The first inequality ensures that the efficiency ratio for the other DMUs is constrained at a maximum of 1 while the second inequality ensures that the weights are positive.

Charnes et al. (1978) who are credited with pioneering the DEA provide a transformation of the fractional linear program above into its standard form:

$$maximise\, E_s = \sum_{r=1}^{s} u_r y_r \tag{2.3.7}$$

$$subject\ to \qquad \sum_{r=1}^{s} u_r y_r - \sum_{i=1}^{m} v_i x_i \leq 0, j \qquad = 1, ..., n \tag{2.3.8}$$

$$\sum_{i=1}^{m} v_i x_i = 1 \ and \ u_i, \ v_i \geq 0 \tag{2.3.9}$$

[12]Specifically, in this study, we define DMU as a bank-year observation on corresponding inputs and outputs measures. Therefore, we evaluate 310 DMUs for each year, resulting in 3100 DMUs over the study period.

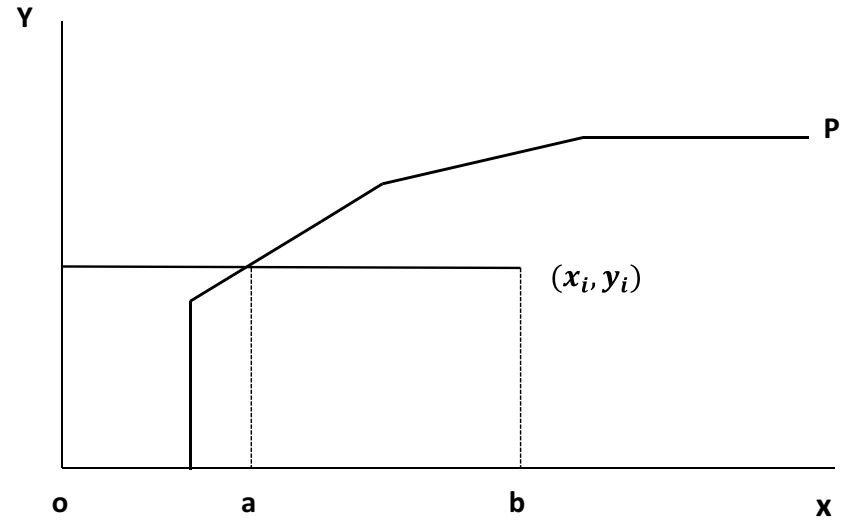
The models outlined above assume constant returns to scale (CRS). Figure 2.1 shows further graphical illustration of the models depicting the production frontier P for a bank with one input and one output. Bank i is operating at point (x_i, y_i). This bank could operate more efficiently by moving to the frontier by reducing its input usage. The bank's level of Farrell (1957) technical efficiency TE(x, y) is given by the ratio $\frac{oa}{ob}$. We also estimate a model of bank profit efficiency that is similar to the model above except in the definition of input and outputs (see Table 2.1). We solve the linear programming problem using the Banker, Charnes, and Cooper (BCC, 1984) methodology available through the DEASolver software by Saitech (Version 7a).[13] Although our sample of dividend announcements is much smaller than the efficiency sample, due to additional sample requirements, we compute bank efficiency on the much larger possible set of banks since the universe of firms in the same industry determines the best practice frontier. In addition, requiring that banks have data for all years also ensures that the same set of banks are evaluated throughout the study period, a condition required for the assessment of the change in efficiency.

However, while our efficiency measure aims to mitigate some of the shortcomings in the use of Tobin's Q and other measures in characterising firm agency problem, we note that it is, yet, not a perfect characterisation of this market imperfection specially given that the resulting efficiency scores may reflect either pure managerial (in)ability or agency problem or both.[14]

[13] While other software options are available, we use this software as it has received positive and credible review by leading academics in frontier analysis (for example, see, Cooper et al., 2007). For further details about the software see http://www.saitech-inc.com.

[14] Because bank in(efficiency) may be a function of factors other than agency problem we also obtained a measure of agency problem as the error term of the regression of the measures of efficiency on bank characteristics that have been linked to bank efficiency, including capital strength, loan quality, bank size, and market share. We find similar results using either the "error term" measures or the pure efficiency scores.

Figure 2.1: Frontier Efficiency - Single Input and Single Output



2.3.3.1 Definition of Inputs and Outputs

A controversial issue in bank efficiency studies relates to the definition of inputs and outputs that are required in the estimation of DEA models. Three competing approaches, namely intermediation approach, production approach, and operating approach, receive attention in the literature. The intermediation approach (Sealey and Lindley, 1977) assumes that banks produce loans and deposit account services, using labour and capital as inputs and the number and type of accounts as measures of outputs. This approach views banks as intermediaries between agents with surplus funds (depositors) and agents with deficit funds (borrowers). The production (value added) approach views banks as financial intermediaries that collect purchased funds and transform them to loans and other assets. Finally, the operating approach (or income-based approach) views financial institutions as business units with the objective of generating more revenues given total costs incurred in running the business (Leightner and Lovell, 1998). This approach defines bank outputs as total revenues (interest and non-interest) and their inputs as total expenses (interest payments and operating expenses). Berger and Humphrey (1997) note that neither the intermediation nor the value added approach is perfect as neither fully captures the dual roles of financial institutions as providers of transaction/document processing services and as financial intermediaries. They point out that the production approach may be somewhat better for the evaluation of the efficiencies of branches of fin-

ancial institutions and the intermediation approach more appropriate for evaluating entire financial institutions. Consistent with most of the recent literature on bank efficiency, we measure bank output using the intermediation approach and estimate the model that has interest bearing liabilities, labour, and capital as inputs, and total loans and securities as outputs. Table 2.1 presents the description of input and output variables that enter into the three DEA models estimated to obtain the efficiency scores.

Table 2.1: Efficiency Estimation - Bank Inputs and Outputs

Model	Description	Inputs	Outputs
1 (EEF1)	Bank Service Efficiency	x_1 : Deposits and Borrowed Funds: Total Deposit (dptc) + Total Borrowed Funds (tb) x_2: Labour: Personnel Expenses (xstfws) x_3: Physical Capital: Fixed Assets (ppent) - Depreciation (dp)	y_1: Interest Bearing Asset (Loans): Net Allowance for loan losses (Intal) + Net Charge Off (nco) y_2: Other Earnings Assets: Total Investment Securities (ist) +Trading /Dealing Account Securities (tdst)
2 (EEF2)	Profit Efficiency	x_1 : Deposits and Borrowed Funds: Total Deposit (dptc) + Total Borrowed Funds (tb) x_2: Labour: Personnel Expenses (xstfws) x_3: Physical Capital: Fixed Assets (ppent) - Depreciation (dp)	y_3: Profit Before Tax and Extraordinary Items (ibcom)
3 (EEF3)	Profit Efficiency	x_4: Total Interest Expenses (xint) x_5: Total Non-interest Expenses (xnitb)	y_4: Gross Interest and Dividend Income (idit+idiis) y_5: Total Non-interest Operating Income (tnii)

The table above presents input and output variables used in the estimation of bank efficiency. Variables in parenthesis are Compustat Bank data items.

2.4 Empirical Results

2.4.1 Descriptive Statistics

Table 2.2 presents the summary statistics for the input and output variables used in the estimation of the efficiency scores. Panel A reports for all bank-years with available

input and output data (the "efficiency sample"). The results in the table show that our sample consists of relatively small and large banks. For example, the mean physical capital of sampled bank is about US$0.34 billion while the maximum is about US$18.83 billion. In addition, Panels B and C of the table suggest that dividend-increasing banks generally make use of larger amount of inputs and produce larger amount of outputs than dividend decreasing banks. For example, while dividend increasing banks have deposits of US$22.57 billion and generate output of about US$0.34 billion in profit on average, dividend decreasing banks have deposits of US$12.16 billion and generate output of about US$0.17 billion in profit on average. However, these absolute values say little about the level of efficiency of dividend increasing banks relative to dividend decreasing banks.

Table 2.3 presents summary statistics for the raw bank efficiency scores derived from the linear programming models using Equations 2.3.5 to 2.3.9, the changes in these scores and other control variables used in the regression analysis. The efficiency scores (EFF1) derived from Model 1 suggest that relative to the best practice banks, dividend increasing US banks seem to exhibit high level of (relative) technical efficiency with the mean (median) efficiency being about 65.32% (64.24%) percent over the period of the study. However, these banks are less profit efficient relative to the best performing banks. For example, the table reports a mean (median) efficiency score of 33.26% (28.82%) on Model 2 (EFF2) for dividend increasing banks suggesting that these banks could achieve the same level of output by reducing their inputs by about 63.3% on average. This result suggests that if profits are the drivers of dividends, as expected, profitable banks paying dividends are not necessarily efficient relative to their industrial peers. Counter-intuitively, Panel B of Table 2.3 shows that the average technical (EFF1) and profit efficiency (EFF1 and EFF2) of dividend decreasing banks are higher than their dividend increasing counterparts. While this result is rather unexpected, it is possible that these banks, even though relatively more profit efficient, fall short on one or more standard criteria, such as capital ratios, used by regulatory authorities in the assessment of banks and make up this shortfall by reducing their dividends.

As the relation between our regression variables and market reactions to dividends differs for some variables depending on direction of dividend change, Panel C of Table 2.2 presents the Pearson correlations between the regression variables separately for dividend increases (below diagonal) and dividend decreases (above). As expected, the market reaction to dividend change (CAAR) is significantly positively correlated with magnitude of dividend change (DIVCHG) for dividend increasing banks. However, even though we report a positive correlation between market reactions and magnitude of dividend

change for dividend decreasing banks, this correlation is not significant at the conventional levels.[15] In addition, as predicted, we find positive relation between changes in bank efficiency and market reactions to dividend increases. However, this relation is only significant for the Model 1 (technical efficiency) and Model 3 (profit efficiency). Again, for the dividend decreasing banks, we find no significant relation between any of the measures of change in bank efficiency. These results suggest that change in bank overinvestment problem, as measured by change in bank efficiency, is an important factor influencing market reactions to dividend increases but seems not to have a significant effect on the market reactions following dividend decreases.

[15] The correlation coefficient between these variables is only significant at 12% and above.

Table 2.2: Summary Statistics - Input and Output Variables

Panel A: All Banks	Mean	SD	Min	Max	Q1	Q2	Q3
Deposits and borrowed funds	28.15	116.20	0.02	1574.31	0.52	1.27	4.94
Personnel expenses	0.42	1.64	0.00	19.16	0.01	0.02	0.07
Physical capital (Fixed Assets)	0.34	1.37	0.00	18.83	0.01	0.02	0.07
Total interest expenses	0.95	4.28	0.00	85.95	0.01	0.03	0.14
Total non-interest expenses	0.88	3.29	0.00	39.04	0.02	0.04	0.14
Interest bearing asset (Loans)	17.84	73.79	0.02	1230.75	0.37	0.90	3.49
Other earnings assets	4.68	20.45	0.00	338.46	0.10	0.30	1.31
Profit before tax	0.30	1.26	-1.36	21.11	0.00	0.01	0.06
Gross Interest and dividend income	1.83	7.15	0.00	98.87	0.04	0.09	0.35
Total non-interest operating income	0.69	2.85	-0.04	42.70	0.00	0.01	0.06
Panel B: Dividend Increasers							
Deposits and borrowed funds	22.57	84.42	0.24	1198.32	1.48	2.64	7.69
Personnel expenses	0.41	1.51	0.00	18.21	0.02	0.04	0.11
Physical capital (Fixed Assets)	0.31	0.97	0.00	9.26	0.02	0.04	0.12
Total interest expenses	0.60	2.51	0.00	43.99	0.04	0.07	0.21
Total non-interest expenses	0.84	3.01	0.01	35.60	0.04	0.08	0.23
Interest bearing asset (Loans)	14.66	51.12	0.16	680.15	1.05	2.06	5.56
Other earnings assets	4.44	15.50	0.01	221.60	0.33	0.66	2.19
Profit before tax	0.34	1.32	-0.03	21.11	0.02	0.03	0.10
Gross Interest and dividend income	1.58	6.00	0.02	90.24	0.10	0.18	0.56
Total non-interest operating income	0.63	2.48	-0.04	37.99	0.02	0.03	0.11
Panel C: Dividend Decreasers							
Deposits and borrowed funds	12.16	41.65	0.16	410.22	1.24	2.53	5.87
Personnel expenses	0.22	0.93	0.00	9.89	0.02	0.04	0.07
Physical capital (Fixed Assets)	0.21	0.82	0.00	7.79	0.02	0.04	0.08
Total interest expenses	0.36	1.30	0.00	12.29	0.03	0.07	0.17
Total non-interest expenses	0.46	1.92	0.01	20.74	0.04	0.07	0.14
Interest bearing asset (Loans)	8.16	28.49	0.12	311.99	0.87	1.83	4.25
Other earnings assets	2.61	7.02	0.02	58.47	0.31	0.70	1.77
Profit before tax	0.17	0.70	-0.04	8.48	0.02	0.04	0.08
Gross Interest and dividend income	0.92	3.42	0.01	35.52	0.09	0.17	0.44
Total non-interest operating income	0.32	1.45	-0.04	15.74	0.01	0.03	0.07

The table above shows the descriptive statistics for the input and output variables for the models of data envelopment analysis. Values are reported in billions (US$). The number of observations in Panels A, B, and C is 3100, 995, and 187, respectively

Table 2.3: Summary Statistics - Bank Efficiency, Abnormal Returns, and Control Variables

Panel A: Dividend Increase

	Mean	SD	Min	Max	Q1	Q2	Q3	N
DIVCHG	0.0006	0.0006	0.0000	0.0082	0.0003	0.0005	0.0007	995
CAAR	0.0043	0.0348	-0.1457	0.5474	-0.0119	0.0035	0.0187	995
LnMVAL	4.6918	1.2082	2.3587	9.9486	3.8943	4.4608	5.2278	847
DIVYLD	0.0248	0.0101	0.0044	0.0642	0.0175	0.0239	0.0316	845
EFF1	0.6532	0.0789	0.3952	0.9734	0.6151	0.6424	0.6855	994
CHGEFF1	-0.0002	0.0345	-0.1559	0.2787	-0.0161	-0.0003	0.0135	915
EFF2	0.3326	0.1457	0.1351	1.1093	0.2315	0.2882	0.3951	994
CHGEFF2	-0.0016	0.0620	-0.3354	0.7344	-0.0240	-0.0012	0.0219	915
EFF3	0.2226	0.1193	0.0000	1.2995	0.1603	0.1996	0.2472	994
CHGEFF3	0.0031	0.0661	-0.2633	1.1339	-0.0162	0.0031	0.0208	915

Panel B: Dividend Decrease

	Mean	SD	Min	Max	Q1	Q2	Q3	N
DIVCHG	-0.0032	0.0039	-0.0000	-0.0286	-0.0038	-0.0021	-0.0011	187
CAAR	-0.0144	0.1476	-0.6974	0.5474	-0.0164	0.0046	0.0312	187
LnMVAL	4.6242	1.2255	1.8818	8.9587	3.8182	4.4884	5.1861	169
DIVYLD	0.0226	0.0134	0.0006	0.0974	0.0143	0.0207	0.0273	167
EFF1	0.6772	0.0989	0.4771	1.0558	0.6113	0.6523	0.7297	184
CHGEFF1	-0.0015	0.0438	-0.1828	0.1623	-0.0170	-0.0003	0.0135	145
EFF2	0.3496	0.1607	0.1351	1.0064	0.2356	0.3114	0.4311	184
CHGEFF2	0.0000	0.0696	-0.3341	0.3600	-0.0266	-0.0021	0.0239	145
EFF3	0.2543	0.1737	0.0000	1.0254	0.1669	0.2139	0.2761	184
CHGEFF3	0.0101	0.0696	-0.2017	0.4205	-0.0175	0.0080	0.0315	145

Panel C: Correlation Matrix

	DIVCHG	CAAR	LnMVAL	DIVYLD	EFF1	CHGEFF1	EFF2	CHGEFF2	EFF3	CHGEFF3
DIVCHG		0.117	-0.050	0.377***	-0.031	0.058	0.023	-0.070	-0.196***	-0.020
CAAR	0.101**		0.047	0.232***	0.109	0.099	0.091	0.054	0.066	0.036
LnMVAL	0.021	-0.010		-0.037	-0.085	-0.072	0.258***	-0.005	0.171**	0.031
DIVYLD	0.054	0.051	0.080**		0.193**	0.047	0.183**	-0.153*	0.101	-0.135
EFF1	0.040	0.027	-0.176***	-0.003		0.238***	0.444***	-0.023	0.587***	0.137*
CHGEFF1	0.061**	0.085**	-0.030	0.003	0.187***		0.025	0.113	0.126	0.037
EFF2	0.194***	0.017	0.352***	0.064*	0.229***	0.023		0.212***	0.695***	0.236***
CHGEFF2	0.029	0.052	0.076**	0.007	-0.055*	0.052	0.236***		-0.022	0.216***
EFF3	0.093	0.024	0.128***	0.096***	0.390***	0.087***	0.616***	0.189***		0.391***
CHGEFF3	0.076**	0.086***	-0.033	-0.124***	-0.004	0.041	0.171***	0.45***	0.417***	

The table presents the descriptive statistics and correlation matrix for the regression variables for dividend increasing and dividend decreasing banks. DIVCHG is a measure of the magnitude of dividend change and is defined as the change in dividend amount (CRSP: divamt - code 1232) divided by the market price of equity (CRSP: absolute value of prc) two days before the dividend announcements date. CAAR is the cumulative average abnormal returns using the market model. DIVYLD measures the anticipated dividend yield and is sum of the prior year dividend amount divided by the market price two days before the dividend announcements day. LnMVAL measures the information environment of the bank and is the natural logarithm of market value of equity at the beginning of the fiscal year of the dividend announcement. EFF1 (CHGEFF1) measures (change in) bank technical efficiency using Model 1 of Table 2.1. EFF2 (CHGEFF2) measures (change in) bank profit efficiency using Model 2 of Table 2.1. EFF3 (CHGEFF3) measures (change in) bank profit efficiency using Model 3 of Table 2.1. All bank efficiency measures are derived from the estimation of model of data envelopment analysis specified in Equation 2.3.6 - 2.3.8 using "DEASolver." All inputs and outputs used in the estimation of the DEA models are defined in Table 2.2. *, **,*** indicate significant at 10%, 5%, and 1%, respectively.

2.4.2 Market Reactions of Announcers

The necessary condition for information content of dividends suggests a positive relation between dividend announcement effect and the sign of the dividend change: If dividends signal private information to the markets one would, at least, expect significant market reactions following announcements of dividend changes. We compute mean abnormal returns and cumulative abnormal returns around dividend change announcements, unconditioned on the (change in) efficiency level, to examine the predicted positive relation between market reactions and the direction of dividend change.

Figure 2.2 shows the cumulative average abnormal returns (CAAR) plot depicting the graphical evolution of cumulative average abnormal returns during the 21-day event window. The figure shows sharper market reactions to dividend decrease announcements than to dividend increase announcements. Table 2.4 and Table 2.5 show the mean abnormal returns calculated for the 21-day event window centred on the announcement day 0 and cumulative average abnormal returns over four separate event windows based on different assumptions about market reactions to dividend change announcements. The tables also show the Boehmer et al.'s (1991) Z-statistic for tests of significance of the average and cumulative average abnormal returns relative to zero at a two-tailed significant level.

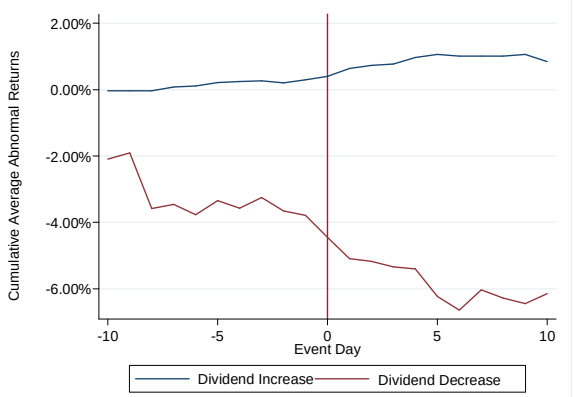
First, consistent with the well-documented evidence of a positive relation between dividend increase and abnormal returns, Table 2.4 reports a significantly positive abnormal returns of 0.11% (Z-statistic= 3.08) on the announcement day for dividend increases (day 0). This result is consistent whether we use the parametric BMP test or non-parametric GST test. In addition, the number of banks with positive returns confirms the picture portrayed by the positive abnormal returns and suggests the results presented in the table do not result from few announcements with large positive abnormal returns. Even though the significantly positive market reactions to dividend increases seem to persist after the announcement date, a larger percentage (52%) of the cumulative abnormal returns of 0.85% is attributable to our designated 3-day event window. Conversely, consistent with the information content of dividends, the results presented in Table 2.5 regarding the sample of dividend decreases show that markets react significantly negatively to dividend decrease announcements. The result suggests a significant announcement day abnormal returns of about -0.66% (Z-statistic=-1.97) on the announcement day for dividend decreases (day 0). However, only 23% (-1.4%) of the 21-day negative market reaction of -6.15% is attributable to the market reaction during the 3-day announcement window.

Overall, the results presented so far are consistent with managerial signalling through

dividends under which market reactions reflect investors' reassessment of bank value following the costly dividend signal. For example, Bajaj and Vijh (1990) report 3-day cumulative abnormal returns around dividend increases (decreases) of 1.04 percent (-1.77%). DeAngelo et al. (2008, 182) remark that on average, dividend increases and initiations are met with a statistically significant share price increase in the neighbourhood of 1% and 3% respectively, while dividend cuts and omissions are typically met with significant share price decline of around 6-10%. However, the relatively larger magnitude of market reactions to dividends in these studies is also due to the fact they are by design restricted to large dividend changes that are usually between the range of 10% (e.g. Lang and Litzenberger, 1989) and 25% (e.g. Grullon et al., 2002) in absolute terms. In contrast, as earlier stated, our study does not place such restriction on the dividend announcement sample.

Tables 2.6-2.8 show the univariate results of the market reactions to dividend announcements conditioned on the variables that proxy for the three leading explanations market reactions to dividend changes: dividend yield (dividend clientele effect), dividend change (cash flow signalling), and bank efficiency (agency cost explanation). Also included in each of these tables are the tests of difference between dividend increasers and dividend decreasers (Columns 4 and 5) and the tests of differences on average abnormal returns (and cumulative abnormal returns) for groups of dividend announcers on standardised dividend change, dividend yield, and bank efficiency (last panel of each table). We use the median of each variable as the cut-off in forming the groups. The results in Columns 4 and 5 of each table generally support the empirically stylised fact of a significantly larger market reactions (in absolute term) following dividend decreases compared to dividend increases (see, Aharony and Swary, 1980; Dielman and Oppenheimer, 1984; Yoon and Starks, 1995; Firth, 1996). This result is consistent with the cash flow signalling model of Bhattacharya (1979), which assumes that the cost of making a cash flow deficit is more than the benefit of a cash flow surplus of this same size. It is also consistent with the model by Kalay (1980), which argues that managers' reluctance to cut dividends is a necessary condition for dividend to convey information. Both papers explicitly suggest that dividend decreases are more costly than dividend increases. In the section that follows, we investigate the relation between market reactions to dividends and changes in bank efficiency within a regression framework.

Figure 2.2: Development of Cumulative Average Abnormal Returns



The figure shows the development of cumulative abnormal returns (CAAR) for the overall sample of 995 and 187 dividend increase and dividend decrease announcements, respectively, within the event window of 21 days. Day 0 is the event date, as reported in CRSP.

Table 2.4: Announcement Period Excess Returns Dividend Increasers

Day	AAR	SCS	CAAR	SCS	Nos of Positive	GST
-10	-0.0004	-0.2035	-0.0004	-0.2035	476	-0.9555
-9	0.0001	0.0875	-0.0003	-0.0805	500	0.5664
-8	-0.0001	0.1916	-0.0004	0.0466	496	0.3127
-7	0.0012	2.9778***	0.0008	1.5270	535	2.7857***
-6	0.0003	-0.0449	0.0011	1.3864	495	0.2493
-5	0.0011	1.3604	0.0022	1.7507*	505	0.8834
-4	0.0003	0.5032	0.0024	1.7866*	493	0.1225
-3	0.0002	0.0315	0.0027	1.8030*	470	-1.3359
-2	-0.0006	-1.2236	0.0021	1.3139	485	-0.3848
-1	0.0009	0.9284	0.0030	1.5576	517	1.6443
0	0.0011	3.0837***	0.0040	2.4071**	522	1.9614**
1	0.0024	4.1983***	0.0064	3.1315***	532	2.5955***
2	0.0009	2.1254**	0.0073	3.9970***	497	0.3761
3	0.0004	0.8941	0.0077	4.3572***	494	0.1859
4	0.0020	2.8754***	0.0097	4.8140***	505	0.8834
5	0.0009	0.5815	0.0106	4.6181***	496	0.3127
6	-0.0005	-0.9227	0.0101	4.5106***	482	-0.5750
7	0.0000	-0.4795	0.0101	4.2758***	474	-1.0823
8	0.0001	-0.3305	0.0102	3.8147***	474	-1.0823
9	0.0005	0.2884	0.0106	4.0912***	508	1.0736***
10	-0.0022	-4.1168***	0.0085	3.3382***	438	-3.3650***
(-1, 1)			0.0044	4.3509***	557	4.1807***
(-10, 10)			0.0085	3.3382***	540	3.1027***
(-10, -2)			0.0021	1.3139	513	1.3907
(2, 10)			0.0021	0.4798	491	-0.0043

Table shows the valuation effect at dividend increase announcements by US banks with data to compute efficiency scores and stock returns for all years 1998-2007. Daily average abnormal returns (AAR) are computed as the out-of-sample residual of the market model. The parameters are estimated, using CRSP equally weighted market index, over -100 through -11, where day 0 is the date of the announcement as reported in CRSP. Stock returns are adjusted for dividend payments and the market model parameters are adjusted using the Scholes-Williams method. CAAR is the cumulative average abnormal returns. SCS denotes the standardised cross-sectional test (Boehmer et al., 1991). "Nos of Positive" refers to the number of positive abnormal returns on day t. GST denotes the generalised sign test (Corrado, 1989 and Cowan 1992). The number of announcements included in the analysis is 995. *, **, *** indicate statistically significant at 1% 5% and 10%, respectively.

Table 2.5: Announcement Period Excess Returns Dividend Decreasers

Day	AAR	SCS	CAAR	SCS	Nos of Positive	GST
-10	-0.0210	-2.3775**	-0.0210	-2.3775**	97	-0.9090
-9	0.0019	0.8144	-0.0190	-12.1712***	98	-0.7620
-8	-0.0167	-1.2991	-0.0358	-1.5411	99	-0.6149
-7	0.0011	-0.7370	-0.0346	-3.7881***	110	1.0026
-6	-0.0030	-0.8704	-0.0377	-3.4212***	102	-0.1738
-5	0.0042	-0.8145	-0.0335	-3.7123***	112	1.2967
-4	-0.0023	-1.2153	-0.0358	-16.6727***	92	-1.6442
-3	0.0033	-1.1317	-0.0325	-3.7884***	111	1.1496
-2	-0.0041	-0.8528	-0.0366	-3.4048***	97	-0.9090
-1	-0.0014	-1.2721	-0.0379	-2.4964***	117	2.0319**
0	-0.0066	-1.9666**	-0.0445	-3.7937***	106	0.4144
1	-0.0064	-1.6301	-0.0509	-3.8442***	96	-1.0561
2	-0.0008	0.0136	-0.0517	-22.9103***	103	-0.0267
3	-0.0017	-1.4155	-0.0534	-9.6122***	84	-2.8206***
4	-0.0006	-0.4994	-0.0540	-6.9832***	110	1.0026
5	-0.0083	-1.7823*	-0.0623	-3.7964***	96	-1.0561
6	-0.0041	-1.3072	-0.0664	-12.8728***	90	-1.9383*
7	0.0060	-0.0899	-0.0604	-17.8849***	101	-0.3208
8	-0.0025	-1.0359	-0.0628	-6.7671***	107	0.5614
9	-0.0016	-1.2536	-0.0644	-8.1949***	97	-0.9090
10	0.0029	1.3146	-0.0615	-24.6198***	98	-0.7620
(-1, 1)			-0.0144	-2.9131***	105	0.2674
(-10, 10)			-0.0615	-24.6198***	102	-0.1738
(-10, -2)			-0.0366	-3.4048***	103	-0.0267
(2, 10)			-0.0106	-8.8576***	105	0.2674

Table shows the valuation effect at dividend decrease announcements by US banks with data to compute efficiency scores and stock returns for all years 1998-2007. Daily average abnormal returns (AAR) are computed as the out-of-sample residual of the market model. The parameters are estimated, using CRSP equally weighted market index, over -100 through -11, where day 0 is the date of the announcement as reported in CRSP. Stock returns are adjusted for dividend payments and the market model parameters are adjusted using the Scholes-Williams method. CAAR is the cumulative average abnormal returns. SCS denotes the standardised cross-sectional test (Boehmer et al., 1991). "Nos of Positive" refers to the number of positive abnormal returns on day t. GST denotes the generalised sign test (Corrado, 1989 and Cowan 1992). The number of announcements included in the analysis is 187. *, **, *** indicate statistically significant at 1% 5% and 10%, respectively.

Table 2.6: Market Reactions by Standardised Dividend Change

	All Announcers	Increasers	Decreasers	Difference in Absolute Value	t-statistic
	(1)	(2)	(3)	(4)	(5)
Panel A: All Changes					
Nos. of Observations	1182	995	187		
AAR	0.0019	0.0011	-0.0066	0.0055	6.08 ***
z-statistic	3.06***	3.08***	-1.97**		
Nos. of Positive AAR	603	522	106		
GST	1.64	1.96**	0.41		
CAAR	0.0059	0.0043	-0.0144	0.0101	8.66***
z-statistic	5.44***	4.35***	-2.91***		
Nos. of Positive CAAR	639	557	105		
GST	3.73***	4.18***	0.27		
Panel B: CHNG<Median					
Nos. of Observations	591	570	21		
AAR	-0.0002	0.0003	-0.0146	0.0143	3.76***
z-statistic	0.99	1.16	-1.07		
Nos. of Positive AAR	293	284	9		
GST	0.11	0.25	-0.68		
CAAR	0.0026	0.0028	-0.0036	0.0008	-0.00
z-statistic	2.53**	2.72***	-0.86		
Nos of Positive CAAR	321	313	8		
GST	2.42**	2.68***	-1.12		
Panel C: CHNG>Median					
Nos. of Observations	591	425	166		
AAR	-0.0001	0.0021	-0.0056	0.0035	4.06***
z-statistic	-0.96	3.31***	-1.92*		
Nos. of Positive AAR	335	238	97		
GST	2.66***	2.72***	0.69		
CAAR	0.0002	0.0064	-0.0157	0.0093	6.01 ***
z-statistic	-1.55	3.37***	-2.90***		
Nos. of Positive CAAR	341	244	97		
GST	3.16***	3.30***	0.69		
Panel D: Test of Difference CHNG<Median-CHNG>Median					
Mean difference on AAR	-0.0001	-0.0018	-0.009		
t-statistic	-0.07	-1.49	-0.43		
Mean Difference on CAAR	0.0024	-0.0036	0.0121		
t-statistic	0.61	-1.63	0.35		

The table reports the tests of significance of average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) as well as tests of difference on average abnormal returns as well as cumulative average abnormal returns between efficient and inefficient dividend announcing banks. The sample consists of 995 dividend increases and 187 dividend decreases announced over the period 1998 to 2007. The estimation period is over days -100 to -11 relative to the announcement date. CAAR refers to the three day (day -1, day 0, and day 1) cumulative average abnormal returns. AAR refers to the average abnormal returns on the announcement day (day 0). Nos. of Positive AAR (CAAR) refers to the number of positive average abnormal returns (cumulative average abnormal returns). Z-statistics are based on Boehmer et al.'s (1991) approach. GST is the generalised sign test (Corrado, 1989; Cowan, 1992). The reported t-statistics relate to the mean comparison tests. ***, **,* indicate significant at 1%, 5%, and 10%, respectively.

Table 2.7: Market Reaction by Dividend Yield

	All Announcers	Increasers	Decreasers	Difference in Absolute Value	t-statistic
	(1)	(2)	(3)	(4)	(5)
Panel A: YLD>Median					
Nos. of Observations	621	506	115		
AAR	0.0020	0.0021	0.0078	0.0057	1.99**
z-statistic	2.73***	3.83***	-1.29		
Nos Positive AAR	320	272	67		
GST	1.63	2.03**	-0.29		
CAAR	0.0046	0.0049	-0.0034	-0.0005	-5.80***
z-statistic	3.15***	3.88***	-1.52		
Nos Positive CAAR	337	285	63		
GST	3.00***	3.18***	0.46		
Panel B: YLD<Median					
Nos. of Observations	561	489	72		
AAR	0.0022	0.0016	-0.1728	0.1712	4.86***
z-statistic	1.27	0.59	-1.45		
Nos Positive AAR	283	250	42		
GST	0.6584	0.7369	0.0833		
CAAR	0.0074	0.0038	-0.3200	0.3162	6.86***
z-statistic	3.19***	2.27**	-3.36		
Nos Positive CAAR	302	272	39		
GST	2.26**	2.73***	0.70		
Panel C: Test of Difference:					
YLD<Median -YLD>Median					
Mean difference on AAR	0.0002	-0.0005	-0.1806*		
t-statistic	0.25	-1.72*	-1.22		
Mean Difference on CAAR	0.0028	-0.0011	-0.2864		
t-statistic	0.71	-0.49	-1.20		

The table reports the tests of significance of average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) as well as tests of difference on average abnormal returns as well as cumulative average abnormal returns between announcing banks with high and low anticipated dividend yields. The sample consists of 995 dividend increases and 187 dividend decreases announced over the period 1998 to 2007. The estimation period is over days -100 to -11 relative to the announcement date. CAAR refers to the three day (day -1, day 0, and day 1) cumulative average abnormal returns. AAR refers to the average abnormal returns on the announcement day (day 0). Nos. of Positive AAR (CAAR) refers to the number of positive average abnormal returns (cumulative average abnormal returns). Z-statistics are based on Boehmer et al.'s (1991) approach. GST is the generalised sign test (Corrado, 1989; Cowan, 1992). The reported t-statistics relate to the mean comparison tests. ***, **,* indicate significant at 10%, 5%, and 1%, respectively.

Table 2.8: Market Reactions by Bank Efficiency

	All Announcers	Increasers	Decreasers	Difference in Absolute Value	t-statistic
	(1)	(2)	(3)	(4)	(5)
Panel A: Efficiency (E)>Median					
Nos. of Observations	594	502	92		
AAR	0.0010	0.0024	0.0067	0.0043	1.46
z-statistic	3.29***	3.43***	-0.30		
Nos. of Positive AAR	325	292	51		
GST	3.00***	3.24***	-0.10		
CAAR	0.0021	0.0038	0.0074	0.0036	3.81***
z-statistic	3.79***	3.33***	-2.15***		
Nos of Positive CAAR	327	284	57		
GST	3.17***	3.95***	1.20		
Panel B: Efficiency (E)<Median					
Nos. of Observations	588	493	95		
AAR	0.0029	-0.0003	-0.020	0.0197	5.38***
z-statistic	1.96**	0.38	-1.94		
Nos. of Positive AAR	278	238	55		
GST	-0.70	1.95	0.64		
CAAR	0.0098	0.0049	-0.0355	0.0306	7.83***
z-statistic	3.78***	2.79***	-2.73***		
Nos. of Positive CAAR	312	265	48		
GST	2.11**	-0.48	-0.80		
Panel C:Test of Difference (E<Median)-(E>Median)					
Mean difference on AAR	0.0019	-0.0026	-0.0267		
t-statistic	0.85	-2.25**	-2.04**		
Mean Difference on CAAR	0.0077	0.0011	-0.0429		
t-statistic	1.99**	0.48	-2.02**		

The table reports the tests of average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) as well as tests of difference on average abnormal returns as well as cumulative average abnormal returns between efficient and inefficient dividend announcing banks. The sample consists of 995 dividend increases and 187 dividend decreases announced over the period 1998 to 2007 that meet the following criteria. The estimation period is over days -100 to -10. CAAR refers to the three day (day -1, day 0, and day 1) cumulative average abnormal returns. AAR refers to the average abnormal returns on the announcement day (day 0). Nos of Positive CAAR (or AAR) refers to the number of positive cumulative abnormal returns (or average abnormal returns). Z-statistics are based on Boehmer et al. (1991) approach. GST is the generalised sign test (Corrado, 1989; Cowan, 1992). The reported t-statistics relate to the mean comparison tests. ***, **,* indicate significant at 1%, 5%, and 10%, respectively.

2.4.3 Regression Analysis

To test the relation between market reaction to dividend change announcements and changes in bank efficiency, controlling for other potential explanatory factors, we estimate the following empirical model separately for the dividend increasers and dividend decreasers using ordinary least squares:

$$CAAR_{i,t} = \beta_0 + \beta_1 DIVCHG_{i,t} + \beta_2 DIVYLD_{i,t} + \beta_3 LnMVAL_{i,t} + \beta_4 CHGEFF_{i,t} + \varepsilon_{i,t} \qquad (2.4.1)$$

where CAAR is the 3-day market model cumulative abnormal returns. DIVCHG is the change in cash dividend amount; LnMVAL is the natural log of market value of equity at the beginning of the year. DIVYLD is the anticipated dividend yield; CHGEFF is the change is efficiency level relative to the previous accounting year, where CHGEFF is CHGEFF1, CHGEFF2 or CHGEFF3.[16]

The first control variable that we include in our announcement effect regression is the magnitude of dividend change (DIVCHG). Various signalling models suggest that management use large dividend changes to signal (large) changes in cash flows. For example, Asquith and Mullins Jr (1983) argue that if dividends signal valuable information, the wealth effect of dividends should exhibit a positive relation with the size of the signal (see, also, Yoon and Starks, 1995). Filbeck and Mullineaux (1993, Table 1) show that the abnormal returns following bank dividend change announcements increase monotonically with the size of the dividend change, suggesting a positive relation between CAAR and DIVCHG. Following Nissim (2003) and Mikhail et al. (2003), we define the magnitude of dividend change (DIVCHG) as change in the quarterly cash amount deflated by share price two days before the dividend declaration date.[17]

The second control variable that we consider is the dividend yield variable that accounts for the dividend clientele effect. The clientele explanation of dividends holds that investors with low marginal tax rates value dividends and invest in high-yield stocks and

[16] Since the DEA models that generated the efficiency scores were estimated using the pooled annual data the one-year change in efficiency at the end of year t signals for all abnormal returns relating to dividend announcements in year $t+1$. Our results are qualitatively similar if we estimate the efficiency scores on quarterly basis and calculate the change in efficiency on quarterly basis.

[17] Nissim (2003) evaluates the choice between prior dividends and pre-announcement price as the appropriate deflator of the dividend change variable. While noting that the deflation with prior dividends is consistent with the literature, he demonstrates that deflating by price results in more precise measure of the magnitude of dividend change, at least in the context of announcement returns regressions. Denis et al. (1994) follow similar method but deflate dividend change by the price two days before the announcement.

will react more to announcements of dividend changes (Fehrs et al., 1988; Bajaj and Vijh, 1990). In line with this argument, Fehrs et al. (1988), Bajaj and Vijh (1990), Mikhail et al. (2003) document a positive (negative) relation between market reactions to dividend increase (decrease) and dividend yield (DIVYLD). We measure past dividend yield as the most recent dividend before the current dividend divided by the market price two days prior to the current period dividend announcements. Finally, we also control for the information environment of banks using the natural logarithm of total market value of equity (LnMVAL) at the beginning of the year of the dividend change announcements. Bajaj and Vijh (1990) report that dividend announcement effects are negatively (positively) related to firm size for dividend increases (decreases).[18]

Table 2.9 presents the results from the estimation of Equation 2.4.1 for the dividend increase and dividend decrease subsamples. Consistent with expectation, we find a strong positive relation between market reaction to dividend increases and the magnitude of dividend changes whatever the model of efficiency used in estimating change in bank efficiency. In addition, our bank data also seem to support a role for the dividend clientele explanation of market reactions to dividend change announcements. We find a strong and significantly positive relation between abnormal returns at dividend change announcements and anticipated dividend yield. However, the coefficient on bank size in not statistically significant in any of the three models. Most importantly, our results establish a link between bank share price and changes in bank efficiency at dividend announcements.[19] Controlling for dividend change, information environment, and dividend clientele effect we find that market reaction to dividend increase is positively related to change in bank efficiency, whatever the model of bank efficiency that we use. This result supports the agency cost explanation of dividends under which markets react positively to change in management investment policy and the desire to mitigate overinvestment problem as signalled by the reduction in bank inputs used in generating outputs through an increase in dividends.

Columns 4-6 of Table 2.9 present the results of the estimation of Equation 2.4.1 for dividend decrease subsample. Contrary to expectation, we find no support for a role of cash flow signalling and the information environment of bank around announcement of dividend decreases. The coefficients on DIVCHG and LnMVAL are not significantly different from zero. In addition, while the coefficients on LnMVAL are of the expected sign in all the models those on DIVCHG are generally negative contrary prediction.

[18] See, also, Eddy and Seifert, 1988; Haw and Kim, 1991; Mitra and Owers, 1995; Mikhail et al., 2003

[19] However, in untabulated results, we find no evidence that market reactions to dividend change announcements is related to subsequent change in bank efficiency.

Moreover, while the coefficient on DIVYLD loads significantly in each model of efficiency, the coefficient is of the wrong sign in the models. Most importantly, we find no evidence that changes in bank efficiency moderate market reactions to announcements of dividend decreases. One can only speculate the reasons for the weak link between the various theories of dividends and market reactions to dividend decreases in our sample. The lack of support for the dividend decreases subsample may be due to lack of power because of the relatively small size of the sample. Second, dividend decreases may not be informative of bank "efficiency news" if banks decreasing dividends are already assessed by the market as financially troubled. While regulatory assessments of banks are usually not formally released to the public evidence suggest that markets react to shares of troubled in a manner consistent with supervisory assessments of banks. Therefore, the lack of support for the role of efficiency changes in dividend decrease subsample may also be due to moderating role of regulatory and supervisory environments of banks.

Table 2.9: Regression Results - Market Reactions and Change in Efficiency

		Dividend Increasers			Dividend Decreasers		
		Technical Efficiency	Profit Efficiency	Profit Efficiency	Technical Efficiency	Profit Effi-ciency	Profit Effi-ciency
		(1)	(2)	(3)	(1)	(2)	(3)
DIVCHG	+/+	6.4754***	6.7613***	6.3333***	0.0603	-0.1812	-0.0517
		(3.45)	(3.57)	(3.33)	(0.01)	(-0.06)	(-0.02)
LnMVAL	- /+	-0.0005	-0.0006	-0.0004	0.0113	0.0098	0.0108
		(-0.53)	(-0.65)	(-0.44)	(1.25)	(1.07)	(1.19)
DIVYLD	+/-	0.2189**	0.2220**	0.2567**	2.2483**	2.3654**	2.3694**
		(2.04)	(2.07)	(2.38)	(2.20)	(2.30)	(2.29)
CHGEFF1	+/-	0.0843***			0.2600		
		(2.84)			(0.90)		
CHGEFF2	+/-		0.0414**			0.1520	
			(2.36)			(0.89)	
CHGEFF3	+/-			0.0436***			0.1199
				(2.80)			(0.71)
Intercept	??	-0.0027	-0.0020	-0.0044	-0.1612**	-0.1531**	-0.1624**
		(-0.36)	(-0.27)	(-0.58)	(-2.13)	(-2.02)	(-2.14)
Adjusted R^2		0.03	0.03	0.03	0.06	0.06	0.06
N		782	782	782	129	129	129

The table presents the estimates of coefficients (above) and t-statistics (below) of the regression of the 3-day cumulative average abnormal returns (CAAR) on change in bank efficiency using ordinary least square estimation. DIVCHG is a measure of the magnitude of dividend change, defined as the change in dividends divided by the market price of equity two days before the dividend announcement day. DIVYLD measures the anticipated dividend yield as sum of the prior year dividend divided by the market price two days before the dividend announcement day. LnMVAL measures the information environment of the bank and is defined as the natural logarithm of market value of equity at the beginning of the year. CHGEFF1, CHGEFF2, and CHGEFF3 are measures of one-year change in the level of efficiency. CHGEFF1 measures a changes in technical efficiency (Model 1) while CHGEFF1 and CHGEFF3 (Model 2 and Model 3) measure changes in profit efficiency. All inputs and outputs used in the estimation of the DEA models are defined in Table 2.1. ***, *,* indicate significant at 1%, 5%, and 10%, respectively.

2.4.4 Additional Analysis

Our finding linking market reactions to changes in bank efficiency draws evidence from the standard event study methodology that models only the announcement returns. Analytical evidence suggests that the standard event study produces biased estimates when the

event is voluntary, as it is the case with the decision to change dividends. In addition, the standard event study methodology may result in biased estimation of abnormal returns as it fails to incorporate market anticipation of the event (Eckbo et al., 1990). Under these conditions, both the announcement returns and the decision to change dividends are endogenous variables. We employ a standard Heckman (1979) two-stage regression methodology to control for the potential sample selection bias. In line with this, we first estimate an ordered probit regression to obtain an additional control variable - the inverse Mills ratio (IMR) - which we include in the market reaction model to control for the selection bias and the potential anticipation of the dividend change event.

Our conditional event study methodology models dividend change decisions and market response in separate equations. The decision to increase, maintain, or decrease dividends is clearly an ordinal variable. Therefore, a simple multinomial logit or probit model would fail to account for the ordinal nature of the variable. An OLS regression would also fail to discriminate between the ordering of the decision as it treats the difference between decreasing and maintaining dividends in the same way as one between maintaining and increasing dividends. To account for the ordinal nature of the dependent variable, and following Goergen et al. (2005) and Christensen and Prabhala (1995), we use the ordered probit model developed by McElvey and Zavoina (1975).

We assume that on each dividend date, banks choose one of three mutually exclusive alternatives: increase dividends (I), maintain dividends (M) or decrease dividends (D).[20] We also assume that the choice among these alternatives is governed by latent variable y_i^*, the net benefit of the dividend decision. Prior to each dividend announcement, investors form expectation about y_i^* based on publicly available firm-specific stock market and financial variables. Thus, dividend decisions are not only a function of management's self-selection based on their assessment of the net benefits resulting from their choice, they are also partially anticipated events suggesting that market reaction to such events is a function of market expectations based on the publicly available information. Suppose that these expectations are governed by:

$$E(y^*) = \beta' x \tag{2.4.2}$$

where x denotes the vector of variables in the market information set and $E(.)$ denotes the expectation operator, conditional on the pre-announcement information set. We can express y^* as:

[20] These options are not exhaustive. For example, banks can take additional dividend decision alternatives such stock dividends or stock repurchase. However, the focus of the study is on cash dividends.

$$y^* = \beta' x + \psi \tag{2.4.3}$$

We interpret ψ as the bank's private information about the net benefit of the dividend change decision. Although $y*$ is not observed by the market, we observe y, which takes the value of 0, 1, and 2 for dividend decreases, maintained, and increases, respectively. Following this assumption we can specify our ordered probit choice model as:

$$\text{Dividend Increases (I)=y=2 if } y^* = \beta' x + \psi \geq \upsilon_D \tag{2.4.4}$$

$$\text{Dividend Decreases (D)=y=0 if } y^* = \beta' x + \psi \leq \upsilon_D \tag{2.4.5}$$

$$\text{Dividend Maintained (M)=y=1 if } y^* = \beta' x + \psi = \upsilon_D \tag{2.4.6}$$

According to this model bank i increases dividends if the underlying latent information $y*$ is equal to, or above, a threshold (good news) and decreases dividends if y^* is below a threshold (bad news). For interim values of $y*$ the bank chooses to maintain dividends. Parameters υ_D and υ_I are the cut-off (threshold) guiding the decision process. Under the assumption that each bank's dividend choice reflects its private information about the net benefit of the dividend change, the announcement of a dividend decision by a bank reveals some private information about the bank and results in market's revision of the expectation about ψ conditional on bank i dividend choice C, $C \in (D, M, I)$. The updated expectation of ψ following dividend announcement depends on the statistical distribution of ψ. If we assume that the random error ψ has a standard normal distribution, N (0,1), an assumption that defines the ordered probit model, then we can calculate the following:

$$\lambda_1(.) = \frac{\phi(\upsilon_I - \beta' x)}{\Phi(\upsilon_I - \beta' x)} \tag{2.4.7}$$

$$\lambda_U(.) = \frac{\phi(\upsilon_I - \beta' x) - \phi(\upsilon_D - \beta' x)}{\Phi(\upsilon_I - \beta' x) - \Phi(\upsilon_D - \beta' x)} \tag{2.4.8}$$

$$\lambda_D(.) = \frac{\phi(\upsilon_D - \beta' x)}{1 - \Phi(\upsilon_D - \beta' x)} \tag{2.4.9}$$

where $\phi(.)$ is the standard normal density function and Φ is the cumulative distribution function of the same distribution evaluated at x. The conditional expectations $\lambda_D(C)$ are

indicator variables for private information and proxy for the unexpected information in dividend change announcements. The coefficient on the respective conditional expectation, analogous to the inverse Mills ratio (IMR) of the Heckman model, should be significant if selection bias is a significant factor in estimating the abnormal returns. The parameters ($\beta_{s,}$ $\upsilon_{D,}$ and υ_I) of the ordered probit model, describing banks information revelation process can be consistently estimated using the maximum likelihood estimation. In line with Greene (2003, 736) parameter υ_D can be set to zero without any loss of generality.

Our ordered probit model requires that we specify a set of firm-specific characteristics and market fundamentals that determine bank decision to change dividends and the market expectation of forthcoming dividend change - the independent variables in our ordered probit model. We estimate market assessment of a bank's probability to change dividends using five of the variables included in the study by Nayak and Prabhala (2001). Specifically, our first stage ordered probit regression includes measures of bank dividend history, bank risk, as well as price history before the dividend change announcements. We include the past dividend variable (PR1DUMMY) that takes the value of -1, 0, or +1 depending on whether the previous quarter's dividend was decreased, unchanged, or increased, respectively. Nayak and Prabhala (2001) suggest a negative relation between the dividend variable and the likelihood that the current dividend is increased. In line with Eades (1982), they argue that firms with high risk are less likely to increase dividends. We account for bank risk using three of their variables - LnMVAL, RUNUP, STKVOL. LnMVAL measures bank size and is the natural logarithm of the market value of bank equity five days before the dividend change announcement. STKVOL is the stock returns volatility computed as the standard deviation of stock returns six months before the dividend change announcement date. RUNUP is the ratio of stock price five trading days prior to and stock price one year before the dividend change announcement. Finally, we also include the bank stock price five days before the announcement of the dividends (PRC5).

Table 2.10: Additional Regression Results - Market Reactions and Change in Efficiency

		Technical Efficiency		Profit Efficiency		Profit Efficiency	
		(1)	(2)	(1)	(2)	(1)	(2)
DIVCHG	+		6.4931***		5.1744**		6.5949***
			(2.60)		(2.07)		(2.66)
DIVYLD	+		0.3053**		0.3614***		0.3072**
			(2.41)		(2.86)		(2.43)
CHGEFF1	+	0.0743**	0.0681*				
		(2.02)	(1.86)				
CHGEFF2	+			0.0647***	0.0640***		
				(3.89)	(3.81)		
CHGEFF3	+					0.0610**	0.0595**
						(2.56)	(2.51)
IMR	??		-0.0057		-0.0058		-0.0057
			(-0.53)		(-0.53)		(-0.52)
Intercept	??	0.0043***	-0.0051	0.0039***	-0.0061	0.0041***	-0.0054
		(3.44)	(-0.90)	(3.18)	(-1.09)	(3.28)	(-0.96)
Adjusted R^2		0.01	0.03	0.03	0.05	0.01	0.04
N		571	571	571	571	571	571

The table presents the estimates of coefficients (above) and t-statistics (below) of the regression of the 3-day cumulative abnormal returns (CAAR) on change in bank efficiency using ordinary least square estimation. DIVCHG is a measure of the magnitude of dividend change, defined as the change in dividends divided by the market price of equity two days before the dividend announcement day. DIVYLD measures the anticipated dividend yield and is sum of the prior year dividends divided by the market price two days before the dividend announcement day. CHGEFF1, CHGEFF2, and CHGEFF3 are measures of one-year change in the level of efficiency. CHGEFF1 measures a changes in technical efficiency (Model 1) while CHGEFF1 and CHGEFF3 (Model 2 and Model 3) measure changes in profit efficiency. IMR is the inverse Mills ratio from the first stage ordered probit regression of dividend change dummy variable (DIVCHG) on specified bank-level and stock market variables. All inputs and outputs used in the estimation of the DEA models are defined in Table 2.1. ***, *,* indicate significant at 1%, 5%, and 10%, respectively.

Table 2.10 presents the estimates of regression of announcement period cumulative average abnormal returns (CAAR) on the change in bank efficiency variables, controlling for the magnitude of dividend change and dividend clientele. The estimated models also include the inverse Mills ratio (IMR) to account for the potential influence of the self selection bias. One cannot assign a negative or positive coefficient estimate to IMR, a priori. We exclude the bank size variable in the second stage OLS regression as it already belongs in our first pass regression. In addition, it receives no support in the unconditional abnormal returns models presented in Table 2.9 above. As shown in Table 2.10,

consistent with the unconditional abnormal returns models, we find a consistently significant positive relation between market reactions to bank dividend changes and changes in bank efficiency. This relation holds even after accounting for the potential selection bias. The insignificant coefficient on the inverse Mills ratio suggests that selection bias is not a significant factor in the estimation of abnormal returns following dividend increases by banks.[21] Overall, the link between market reactions and change in bank efficiency does not appear to be spurious.

2.5 Conclusion

The study examines the relation between market reactions to dividend change announcements and changes in bank overinvestment problem. We measure bank overinvestment problem as the change in bank (in)efficiency, derived from a non-parametric frontier analysis of bank input-output combination. Consistent with the agency-based explanation of dividends and empirical studies linking firm efficiency to (changes in) share prices, we find that controlling for bank dividend change, information environment, and dividend clienteles, markets react positively to improvement in the level of bank efficiency by dividend increasing banks. This result holds whether we define bank overinvestment problem using either technical efficiency model or profit efficiency model. However, our result fails to hold for dividend decreasing subsample.

The limitations in our study offer great opportunities for future extensions. For example, our study draws evidence from a sample of bank dividend announcements. It will be interesting to examine whether the finding in this study holds for other industries and for larger dividend announcement samples, especially for the dividend decrease subsample. In addition, we estimated our bank efficiency score using the non-parametric data envelopment analysis. In view of the limitations of the methodology, especially regarding the assumption of zero measurement error, further studies could triangulate our findings using parametric frontier methodology, such as stochastic frontier analysis.

[21] We do not re-examine the dividend decrease subsample for two reasons: First, our unconditional event study results do not suggest a role for bank efficiency in market reactions to announcement of bank dividend decrease. In addition, additional data requirements, especially for STKVOL, to estimate inverse Mills ratio result in further loss of sample units for the dividend decrease subsample.

3 Market Rewards Associated with Bank Earnings Quality

Abstract

The study investigates three market consequences of bank earnings quality. We construct an aggregate measure of bank earnings quality that incorporates four earnings attributes (accruals quality, earnings persistence, earnings predictability, and earnings smoothing). Using our aggregate earnings quality measure, we investigate the implications of bank earnings quality for bank cost of equity, bank valuation, and value relevance of bank earnings. Our results suggest that markets place a value on bank earnings quality, consistent with the idea that higher earnings quality reduces information risk by reducing information asymmetry. The study documents three important findings. First, we find evidence of a significantly negative relation between bank earnings quality and bank cost of equity, measured using a battery of earnings-based valuation models. Consistent with our primary finding, the study documents a significantly positive relation between bank earnings quality and market valuation of banks. Finally, we find that the relation between earnings and bank market price is conditional on the quality of earnings. After controlling for risk, bank size, and growth, banks with better earnings quality have significantly higher price-earnings multiples than banks with low earnings quality.

3.1 Introduction

Recent analytical and empirical studies in the field of finance and accounting focus on the controversy regarding the implication of the quality and quantity of financial accounting information for the cost of capital. Research in this area is of immense importance in view of number of high profile corporate failures, in part, due to the quality of accounting information available to investors (e.g. Enron, Worldcom, BCCI, and Parmalat). The International Accounting Standards Board (IASB) is unequivocal in stating that the role of financial statements is: 'to provide information about the financial position, financial performance, and cash flows of an entity that is useful to a wide range of users in making

economic decisions' (IAS 1, 2007).[1] Implied by this primary objective of accounting is the proposition that accounting information may have a direct and/or an indirect role in capital markets. In line with this implication, a number of theoretical studies suggest that the role of accounting information is distinguishable from competing candidate factors that drive a firm's stock market variables. Empirical attempts at documenting evidence in support of these theories have centred on establishing an association between disclosure level (and quality) and the cost of equity. Others have taken a stronger view by suggesting a separate pricing of information risk associated with information asymmetry and precision of (accounting) information.

Motivated by the various theoretical work linking the information environment of firms to capital market variables, such as stock liquidity, stock performance, institutional ownership, and analyst following, our primary research question relates to whether banks with better earnings quality enjoy lower cost of equity. However, the study also contributes to the literature on the consequences of quality and quantity of financial reporting (e.g. Botosan, 1997; Baber et al., 1998; Collins and Kothari, 1989; Francis et al., 2004); the literature investigating the determinants of firm valuation (e.g. La Porta et al., 2002; Brown and Caylor, 2006; Caprio et al., 2007; Ammann et al., 2010); and that examining the determinants of value relevance of accounting information (e.g. Barth et al., 1999).

Theoretical work relating information risk to the cost of equity, which serves as the foundation for the link between earnings quality and the cost of equity, provides contrasting prediction on this issue. For example, Easley and O'Hara (2002, 2004) argue in support of a role of information in reducing the cost of equity by reducing information risk. However, Lambert et al. (2007) suggest that the impact of information risk on the cost of equity may be positive or negative but their conclusion rules out a separate risk factor in asset pricing models.

This controversy also extends to empirical studies attempting to link the quantity and quality of information to the cost of equity. For example, Barth et al. (2008) examine the relation between cost of capital and earnings transparency, an earnings quality attribute. After controlling for Fama and French and momentum factors, they find that firms with more transparent earnings have lower cost of equity as reflected in cross-sectional variation in the expected cost of equity, subsequent excess returns, and mean differences in stock returns. On the other hand, McInnis (2010) examines the notion that smoother earnings, another desirable attribute of earnings, lead to a lower cost of equity and finds

[1] IAS 1 - Presentation of Financial Statements - is the first of the many International Accounting Statements (IAS) issued by the International Accounting Standards Board.

no relation between earnings smoothness and average stock returns, the implied cost of equity capital, and excess returns.

While we are aware of studies relating information quality to the cost of capital (e.g. Francis et al., 2004) and those linking disclosure level to the cost of equity (e.g. Botosan, 1997; Botosan et al., 2004), except for Poshakwale and Courtis (2005), we are unaware of studies linking bank financial reporting to the cost of equity.[2] In view of the evidence suggesting that the relation between information and the cost of equity is sensitive to the dimensions of information, it is important to know whether this relation and/or its economic relevance is context specific. In fact, Botosan (1997) suggests that, at least, the first is plausible. She finds no significant relation between the cost of equity and disclosure level for firms that attract a greater number of analysts, firms for which information asymmetry is less of a problem. In view of this finding and the inconclusive evidence on the link between information and the cost of equity, we revisit this hypothesis by focusing on the banking sector that some authors argue exhibits greater level of information asymmetry suggesting a greater link between information and the cost of equity. However, the mitigating role of regulation and supervision aimed at reducing information asymmetry may also attenuate the role of information disclosure on bank cost of capital. Therefore, whether information risk plays a role in bank cost of capital and, if it does, the magnitude of this role are empirical questions that this study aims to answer.

In addition, we further extend the literature by offering indirect evidence on the relation between bank cost of equity capital and earnings quality. In this regard, we examine the relation between bank earnings quality and market valuation of banks. We ask whether markets value bank earnings quality: If information quality is an important driver of the cost of equity, not only should we expect a negative relation between earnings quality and the cost of equity, this relation should translate into a positive relation between earnings quality and bank valuation. Finally, we extend the study to the value relevance literature in accounting and ask whether earnings of banks that are of higher quality are more value relevant than earnings that are of lower quality.

From a practical point of view, the effect of earnings quality is of considerable importance to the financial reporting community as accounting information that is of higher quality improves decision usefulness and reduces investor uncertainty. Better quality accounting information also enables better monitoring of managers thus reducing monit-

[2]Poshakwale and Courtis (2005) relate the disclosure level of 135 banks in three continents to bank cost of equity. We study the quality of information, and not the quantity.

oring cost that would otherwise be required to certify the accounting information released by management. However, given that the provision of better information is costly, managers would be more motivated to provide better information if they are aware of the associated benefits that shareholders stand to gain, assuming management act in the interest of shareholders. In addition, this study also speaks to the market discipline of banks, which is one of the three pillars of the current Basle II framework. For example, while discussing the costs and benefits of disclosure requirements under the Basle II framework, the Basle Committee argues 'that an appropriate level of timely disclosure will have benefits for well-run institutions, investors and depositors, for financial stability more generally, and will help support the effective and efficient operation of the capital markets' (Basle Committee Consultative Document, 2001, 3).[3]

To put the study in clearer perspective, this chapter presents the results of the investigation of three implications of earnings quality: bank cost of equity, bank valuation, and value relevance of earnings. We measure earnings quality using a composite earnings quality score made up of four accounting based earnings attributes, namely persistence, predictability, smoothness, and accruals quality. In view of the fact that all cost of equity measures are 'unavoidably imprecise' (Fama and French, 1997, 153), to mitigate the sensitivity of our results to the choice of the cost of equity adopted (e.g. Botosan and Plumlee, 2002), we first validate individual cost of equity measures. We use the expected positive association between the cost of equity and beta as our primary benchmark.

The study then examines the association between earnings quality and the cost of equity by regressing bank-specific estimate of cost of equity, derived as the average of five earnings-based measures of cost of equity, on market beta, firm size, book to market ratio, and individual as well as composite accounting based measures of earnings quality. Consistent with the hypothesis that information quality is negatively associated with bank cost of equity, we find a significant negative relation between the cost of equity and composite measure of earnings quality. The magnitude of the difference in cost of equity capital suggests that one unit increase in aggregate earnings quality is associated with approximately 10 basis point reduction in the cost of equity capital after controlling for market beta, bank size, and book to market ratio. The lower reduction in the cost of equity for banks, compared with those reported in other non-banking studies, seems to support our proposition that the role of accounting information is context specific and may be of lower economic significance for firms exposed to high regulation and

[3]The proponents of the Sarbanes-Oxley Act put forward a similar argument (e.g. see, Ogneva et al., 2007).

supervision, primarily aimed at reducing information asymmetry. For example, Botosan (1997) reports a reduction in the cost of equity that average about 28 basis points for manufacturing firms that attract low analyst following while Botosan and Plumlee (2002) report a reduction in the cost of equity that average about 0.7 percentage points for firms providing the most annual report disclosure relative to those providing the least. Our results also show that the relation between the cost of equity and components of earnings quality is neither consistently significant nor exhibit similar direction across all earnings quality dimensions. For example, while we report a negative and significant relation between the cost of equity and predictability as well as accruals quality, the relation between the cost of equity and persistence is insignificantly positive at all conventional levels.

Consistent with the idea of a negative relation between the cost of equity and bank earnings quality, we also find significant positive relation between our composite measure of earnings quality and bank valuation. However, of the four earnings attributes considered in this study, only persistence and smoothing dimensions exhibit consistently positive relation with bank value, no matter the definition of bank value that we adopt. While the quality of loan loss provisions (accruals) exhibits a consistently negative relation with bank value, this relationship is not significant across different model specifications. In addition, and contrary to expectation, our predictability dimension of earnings exhibits a consistently significant negative relation with bank value. These results are consistent with Dechow et al. (2010) who note that different earnings quality measures do not necessarily generate similar outcomes.

We address the potential endogeneity bias inherent in the relation between bank value and earnings quality using instrumental variable approach. While not perfect, we believe that the instrumental variables that we advance in this study provide innovative variables for dealing with the endogeneity of earnings quality in empirical models linking bank earnings quality to specified market and non-market outcomes. Specifically, our instrumental variables strategy involves the categorisation of banks based on whether they are subject to a provision of Federal Deposit Insurance Corporation Improvement Act of 1991 requiring internal control reports. We use this variable as evidence suggests an improvement in earnings quality for banks that are subject to this requirement. In addition, we also use a dummy variable to account for the documented positive impact of the Sarbanes and Oxley Act of 2002 on the quality and reliability of reported financial information. Finally, in view of the tax-incentive to manage earnings, we use bank lagged tax liability as an instrument for earnings quality. The relationship between our composite measure

of earnings quality and bank valuation remains significantly positive even after addressing the potential impact of endogeneity of earnings quality.

Finally, we extend our study to the value relevance literature in accounting. Consistent with past studies we find a positive relation between (change in) stock price and bank earnings. Most importantly, in further support of a negative relation between cost of equity and earnings quality, our results show that the value relevance of earnings is conditional on market assessment of bank earnings quality. Banks with high earnings quality enjoy higher price-earnings multiples compared to similar banks with low earnings quality.

The remainder of the chapter proceeds as follows. In Section 3.2 we discuss the theoretical and conceptual framework of the study and present the hypotheses tested in this study. Section 3.3 describes the methodology we adopt in investigating the relation between earnings quality and capital market variables. Section 3.4 presents and discusses the empirical results on the relation between bank cost of capital and earnings quality. Section 3.5 presents and discusses the empirical results on the relation between earnings quality and bank valuation while Section 3.6 presents and discusses the empirical results on the impact of earnings quality on value relevance of earnings. Finally, Section 3.7 concludes the chapter by providing a summary of the results and laying out the implications for investors, bank regulators, as well as policy-makers.

3.2 Development of Hypotheses

In the traditional asset pricing literature, only systematic risk affects expected stock returns. Under this framework, it is impossible to establish a relation between firm-specific risk and the cost of capital as such diversifiable risk does not affect the variance of a well-diversified portfolio. However, recent theoretical models suggest a link between nondiversifiable information risk, resulting from information asymmetry, and the cost of capital. Two strands of research provide theoretical support for an association between information risk and the cost of capital.

The first strand of research relies on the assumption that private information gives rise to greater information asymmetry, greater information risk, and results in higher cost of capital. Therefore, greater public information, whether mandated or voluntary, reduces information asymmetries among informed and uninformed market participants thereby increasing stock market liquidity leading to a reduction in the cost of equity, through either a reduction in transaction cost or increased demand for a firm's securities.

For example, Amihud and Mendelson (1986) show that the cost of equity is higher for stocks with wider bid-ask spreads because investors demand compensation for additional transaction cost. Therefore, greater disclosure lowers information asymmetry and the associated adverse selection component of the cost of capital by attenuating the bid-ask spread, enhancing trading volume, and reducing stock return volatility. Diamond and Verrecchia (1991) suggest that greater information disclosure reduces the adverse price effect associated with information revelation of large trades. The reduction in information asymmetry associated with the release of information triggers more active and larger trading in the shares of the firm, thus increasing market liquidity and firm's current price, and reducing the cost of equity (Leuz and Verrecchia, 2000). More recently, Easley and O'Hara (2004) develop a multi-asset, multi-period rational expectation model that suggests a pricing role for the quantity of private versus public information available to informed and non-informed investors. In their model, the information risk faced by the uninformed investor is nondiversifiable and investors require an appropriate compensation for bearing this risk. As informed investors are better able to shift their portfolio weight to take advantage of new information, more private information increases uninformed investors' risk of holding the stock relative to informed investors. Uninformed investors thus require higher returns as compensation for the nondiversifiable risk they bear. The higher returns translate into higher cost of capital for the information opaque firms.

While their conclusion is indistinguishable from those arguing for a role of information in the cost of equity through market liquidity and transaction cost, the second strand of studies shows that information affects the cost of equity through its impact on the estimation of the parameters of stock returns or payoff distributions. It argues that the estimation risk, which explains the proposed negative link between information quality and cost of capital, results because investors have to estimate the parameters of a security's return or its payoff distribution from available information when forming their optimal portfolio. Therefore, low information quality results in high estimation risk that is nondiversifiable (Clarkson and Thompson, 1990; Handa and Linn, 1993; Lambert et al., 2007).

An important implication from the "market liquidity" and "estimation risk" strands of studies is that firms can reduce their cost of capital by making available better quality (i.e. more precise) and larger quantity of information (i.e. higher disclosure level) to investors. However, a handful of accounting and asset pricing empiricists extend this implication and suggest a separate market pricing of accounting information distinct from that proposed by the CAPM, Fama and French, and momentum factors.

Botosan (1997) provides the first evidence linking disclosure level to the cost of equity. Using a sample of 122 manufacturing firms for the year 1990, she shows that for firms that attract a low analyst following greater disclosure level is associated with a lower cost of equity. However, she reports no relation between disclosure level and the cost of equity for the full sample and the subsample of firms that attract high analyst following. Botosan and Plumlee (2002) re-examine the association between the cost of equity and levels of annual report, timely disclosure, and investor relations activities using a larger sample. They find that the cost of equity decreases in the annual report disclosure level but increases in the level of timely disclosure. While the latter evidence is inconsistent with theory it is consistent with the view held by managers that greater timely disclosure results in higher price volatility resulting in an increase in the cost of equity capital (e.g. Berton, 1994). Contrary to Botosan (1997), Botosan and Plumlee (2002) show that firms that attract high analyst following benefit from providing greater information.

Poshakwale and Courtis (2005) extend the link between the cost of equity and disclosure level to the banking sector using a sample of 135 banks from Europe, North America, and Australia. Their disclosure score consists of six disclosure categories i.e. strategy, customers and markets, people and reputation, risk management, financial position, and financial performance. The authors argue that higher level of voluntary disclosure lowers investor uncertainty, which encourages investors to accept lower dividend payout. A lower dividend stream reduces the cost of capital because of a lower risk premium expected by investors. Consistent with their prediction, after controlling for cross-sectional variation in firm characteristics such as market beta, firm size, book to market ratio, and price to earnings ratio, they find a negative relation between their disclosure score and the price to book value multiple, their proxy for bank cost of equity. However, they report that the primary driver of this relation is management's disclosures about risk management; that is, not all disclosures matter. In addition, their results suggest a geographical dimension to the issue as European banks show greater reduction in the cost of equity capital from improved disclosures compared to their non-European counterparts.

A handful of accounting and asset pricing empiricists suggest a separate market pricing of accounting information distinct from that proposed by the CAPM and the Fama and French and momentum factors. The guidance from this line of research remains inconclusive. For example, Easley et al. (2002) show that differences in the probability of information-based (PIN) trading is associated with differences in expected returns. However, while Mohanram and Rajgopal (2009) also find some evidence that PIN predicts future returns their finding is not robust to alternative specifications and sample

periods. In addition, their study shows no evidence that PIN loadings predict returns after controlling for the usual firm characteristics.

Using an accruals quality factor as proxy for information risk, Francis et al. (2005) find evidence in support of market pricing of accruals quality and conclude that information risk is a priced risk factor. However, Core et al. (2008) query this conclusion. Specifically, they note that it is impossible to conclude a positive pricing of accruals quality merely by establishing a positive factor loading in a contemporaneous time series regression. Using an analogy similar to positive factor loading on the market portfolio, they argue that average positive coefficient on the AQ factor does not imply that AQ is a priced risk factor. Rather, an average positive regression coefficient means that, on average, firms have a positive contemporaneous exposure to the AQ factor mimicking strategy. Using a battery of asset pricing tests, they find no separate role for information risk, as proxied by accruals quality.[4]

If information asymmetry is an important driver of the cost of equity, the best research setting that provides the greatest opportunity to uncover this relation should be one characterised by high information asymmetry. Using Jin and Myers' (2006) model, Haggard and Howe (2007) examine the relative firm-specific information in bank equity returns compared with industrial matched firms. They show that banks have less firm-specific information compared to matched firms. They interpret their results as consistent with the notion that banks are more opaque than industrial firms are. Thus, ceteris paribus, banks should provide stronger evidence on the implication of earnings quality cum information risk for the cost of equity. The higher opaqueness of banks relative to industrial firms would seem to suggest that banks are more risky than their corporate customers are. Higher information risk make for more risky equity and the expected rate of return demanded by investors should reflect this additional risk. However, the relative opaqueness of banks is also an important argument for bank regulation and supervision, suggesting that the role of information asymmetry for the cost of equity may be weak. Ultimately, whether information quality has an impact on bank cost of capital is an empirical question.

The theoretical and empirical studies that we discuss above suggest that higher quality information is associated with lower cost of capital. In the context of financial reporting, we interpret higher quality information as more earnings quality. This gives support for our basic hypothesis stated in its alternative form:

[4]However, see Gray et al. (2009) for Australian evidence of positive pricing of accruals quality based on asset pricing tests suggested by Core et al. (2008)

H1: There is a negative relationship between bank cost of equity capital and bank information quality, as measured by earnings quality.

The theoretical and empirical studies also suggest an indirect link between information quality and firm valuation. Given that a firm's value is a function of its future cash flows and the cost of capital, if information risk matters, management could reduce bank cost of capital and increase the value of the bank by providing better quality information. This argument supports our second hypothesis stated in its alternative form:

H2: There is a positive relationship between market valuation of banks and bank information quality, as measured by earnings quality.

Lev (1989) states that one explanation for low R-squares in earnings or returns model is that 'no serious attempt is being made to question the quality of the reported earnings number prior to correlation with returns.' Botosan (2000) suggests that the ultimate benefit of providing more information to the capital market is a lower cost of equity capital and thus a higher stock price, for a given level of earnings. Thus, both authors imply that the relation between earnings and price is conditional on the quality of earnings, which suggests our third hypothesis stated in its alternative form:

H3a: The price-earnings relation is dependent on bank information quality, as measured by earnings quality.

H3b: The price-earnings relation is more positive for banks with higher information quality, as measured by earnings quality.

3.3 Methodology

Section 3.3.1 discusses the procedure we follow in constructing the composite earnings quality score (EQS) and its individual components. Section 3.3.2 describes the data sources and sample construction procedure. Model specifications and measurements of variables are reserved for relevant sections of the issues that we examine.

3.3.1 Measuring Bank Earnings Quality

Earnings quality is a multi-dimensional descriptive characteristic of earnings first introduced to the accounting literature by Lev (1989). Dechow et al. (2010), who define

earnings quality from the point of view of the decision usefulness, provide one interpretation of earnings quality. According to these authors, higher quality earnings that more faithfully represent the features of a firm's fundamental earnings process are relevant to specific decision made by the decision maker.

In view of the multi-dimensional nature of earnings quality, researchers have proposed different constructs to capture the properties of earnings. Schipper and Vincent (2003) propose that persistence, predictability, and volatility of earnings reflect earnings quality. Penman and Zhang (2002) and Richardson (2003) suggest that higher earnings quality is associated with more persistent earnings while Bricker et al. (1995) and Mikhail et al. (2003) define earnings quality as the extent to which a firm's past earnings is associated with its future cash flows. Other authors distinguish between accounting based and market based measures of earnings quality. Our study is restricted to accounting based measures of earnings quality.[5] Following previous studies, in particular those by Francis et al. (2004) and Ecker et al. (2006), we use four accounting based measures of earnings quality to capture various dimensions of the construct. These are accruals quality, earnings persistence, earnings predictability, and earnings smoothness. While the operationalisation of these constructs is consistent with previous studies, in view of the special nature of banking and banking data, we differ, where necessary, in the way that we construct these variables.

3.3.1.1 Accruals quality - Loan Loss Provisions Quality

Prior studies measure accruals quality using either the mapping of current accruals into cash flows or some measure of abnormal accruals (e.g. Dechow and Dichev, 2002; Francis et al., 2004, 2005). These studies suggest that earnings that map more closely into cash are more desirable. Given that the purpose of accruals is to alter the timing of cash flow recognition and earnings, Dechow and Dichev (2002) measure accruals as a function of past, present, and future cash flows. The standard deviation of the firm-specific residuals and the absolute values of the residuals from models of accruals are used as (reliable) proxies for accruals quality. However, measuring accruals for banks is difficult because the accruals components of interest, such as revenue and expenses, are not available from Compustat Bank and other data providers. In addition, necessary data relating to depreciation expenses and deferred tax expense are largely missing. However, because they represent the major component of bank accruals, loan loss provisions (LLP) represent

[5] Dechow et al. (2010) provide a detailed review of the current state of the literature on the determinants and consequences of earnings quality.

the key accrual accounting choice in bank income statements. They are therefore likely to have a first order effect on the information properties of bank earnings (Bushman and Williams, 2009). Thus, we circumvent the difficulty with data by operationalising accruals quality using the magnitude of discretionary loan loss provisions.

The earnings management literature on banks has traditionally treated large values of discretionary loan loss provisions as indicative of earnings management because discretionary loan loss provisions can be used to both increase or decrease earnings. Kanagaretnam et al. (2009) argue that the inherent uncertainty and the permitted discretion in estimating loan loss provisions contribute to information asymmetry. In addition, as Kanagaretham et al. (2010) argue, abnormal loan loss provisions may provide a better measure of earnings quality than the more popular abnormal accruals based model. They argue that such a model mitigates error in measuring managerial discretion by focusing on a single accrual, and in this case a single industry. We adopt a model similar to the LLP model by Collins et al. (1995) and Ahmed et al. (1999). Specifically, for each quarter in the study we run the following model:[6]

$$\begin{aligned} LLP_{i,t} &= \beta_0 + \beta_1 LLA_{i,t-1} + \beta_2 CHGLOAN_{i,t} + \beta_3 LOAN_{i,t} \\ &\quad + \beta_4 LCO_{i,t} + \beta_5 NPL_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{3.3.1}$$

where i and t are the bank and date (quarter) subscripts, respectively; LLP is the loan loss provisions, LLA is the loan loss allowance, LOAN (CHGLOAN) is gross loans (change in gross loans) and NPL is non-performing loans. We deflate all variables by total assets. In view of the potential loss of data if we ran bank-specific regressions, we estimate Equation 3.3.1 cross-sectionally with the implicit assumption that banks have similar parameters for each quarter.

We measure abnormal or discretionary accruals (ABACC) as the absolute value of the residuals from the quarterly regressions. That is, ABACC is the difference between the reported loan loss provisions (LLP) and the expected (normal) loan loss provisions, estimated in Equation 3.3.1. The use of the error terms of the above regression as a measure of accruals quality is also supported by Dechow et al. (2010), who note that residuals from accrual models represent management discretion or estimation errors,

[6] Even though we use annual data in our analysis, because of the dearth of time series data to construct the bank-specific earnings quality attributes, we estimate these attributes using quarterly data. The final sample is made of quarter 4 earnings quality measures.

both of which reduce decision usefulness.[7] Lower values of non-discretionary accruals are associated with higher accruals quality (loan loss provisions) and higher quality of earnings (lower information risk). That is, ABACC is the negative of the absolute values of non-discretionary loan loss provisions.[8]

3.3.1.2 Earnings Persistence

Earnings persistence captures the sustainability of earnings and refers to the time series relation between current period earnings shock and future earnings. Persistence measures the extent that current earnings persist or recur in the future. High persistence is positively associated with high earnings quality since it indicates a stable, sustainable and less volatile earnings that is of value to investors. In addition, the desirability of earnings persistence as a measure of earnings quality is motivated on the assumption that more persistent earnings yield better inputs to equity valuation and thus generate more accurate DCF-based equity valuation, implying greater decision usefulness (Dechow and Schrand, 2004; Dechow et al., 2010) and lower information risk. Dechow et al. (2010) argue that earnings persistence fits well with a Graham and Dodd's (1934) view of earnings as a summary metric of expected cash flows useful for equity valuation.

Francis et al. (2004) suggest a direct link between earnings persistence and information risk. According to these authors, because earnings persistence is associated with a more sustainable earnings stream, investors need not be concerned about the extent to which the innovation in the current period earnings will continue thus reducing one source of uncertainty.

It is common to estimate earnings persistence using the slope coefficient from a regression of current earnings on lagged earnings, or its components, such as cash flows and accruals. Following Kormendi and Lipe (1987), we obtain the slope coefficient estimates of the earnings persistence from the bank-level regression of current earnings on lagged earnings. Therefore, under the assumption that earnings follow an AR(1) process we measure earnings persistent as the slope coefficient estimate, $\beta_{1,i}$, from an autoregressive model of order one (AR1):

[7] We acknowledge, however, that like many non-bank specific accrual models, this model can be imprecise in estimating abnormal (discretionary) accruals. Guay et al. (1996) provide some criticisms of these models.

[8] As accruals tend to reverse within a one to 2-year period (Richardson et al., 2005), we also use the average values of absolute accruals over the past three years to mitigate the effects of any temporary large abnormal accruals. As we obtain similar qualitative results using the current period abnormal accruals, we report only the results using current year accruals as these are based on larger sample thus increasing the power of our tests.

$$EARN_{i,t} = \beta_{0,i} + \beta_{1,i} EARN_{i,t-1} + \varepsilon_{i,t} \quad (3.3.2)$$

Equation 3.3.2 describes the univariate characteristic of earnings where EARN is net income before extraordinary items deflated by total assets; β_1 is the autoregressive coefficient and ε is the serially uncorrelated earnings shock. Kormendi and Lipe (1987) show that large β_1 coefficients cause the current period earnings shock to have a larger impact on future earnings (greater persistence). We estimate Equation 3.3.2 for each bank-quarter using a ten-quarter rolling window.[9] Values of β_1 close to 1 (or greater than 1) imply highly persistent earnings, while values of β_1 close to 0 imply highly transitory earnings. Persistent earnings are indicative of higher quality earnings while transitory earnings are indicative of lower earnings quality.[10]

3.3.1.3 Earnings Predictability

Lipe (1990) provides a measure of earnings predictability defined as the variance of the earnings shock, the residual from the AR(1) model of earnings above. We derive our measure of earnings predictability as the square root of the estimated error variance of Equation 3.3.2:[11]

$$PREDICT_{i,t} = [\sigma^2(\varepsilon_{i,t})]^{(1/2)} \quad (3.3.3)$$

[9] We acknowledge a limitation of our research design in this regard. Expectedly, the concepts of earnings persistence, predictability and smoothing are more meaningful in the presence of more time series data. Requiring ten quarterly data amounts to about two and half years of data; longer data should give a more reliable estimate of any of our earnings quality measures, especially using bank-specific regression, as this minimises the impact of any short-term shock in the data generation process. However, using longer period results in almost a complete loss of our potential sample. In addition, the use of longer data restricts the sample to larger, more successful banks and limits the extent to which our findings may be generalised. We believe that by using an aggregate earnings quality measure, we are able to mitigate any concern regarding the short window adopted in estimating the earnings attributes. We are also motivated by the fact that Beatty and Liao (2011) use quarterly data of the same duration in estimating bank-specific variables.

[10] We also use a naive measure of persistence, adopted from Dechow and Dichev (2002), Wysocki (2009), and Altamuro and Beatty (2010), by estimating the correlation between current earnings and future earnings. As expected, given that this measure uses the same variables as our persistence model, we obtain qualitatively similar results.

[11] Traditionally, this construct measures the ability of current earnings to predict future cash flows from operations. Wysocki (2005) argues that if investors ultimately value future cash flows, then the predictive ability of current earnings for future cash flows is an important earnings quality metric for investors. Following this argument, we also measure predictability of earnings as bank-specific Pearson correlation between current earnings (net income before extraordinary) and future cash flows from operations (net income before extraordinary plus loan loss provisions). This measure exhibits a high and positively significant correlation with the PREDICT variable that we adopt in this study.

Higher values of PREDICT indicate lower levels of earnings predictability implying lower quality earnings. To be consistent with measures for other attributes for which higher level of the attribute indicates higher earnings quality, we take the negative of PREDICT. While PERSIST is related to both the level of earnings and the variability of innovation series, PREDICT is related to the variability of innovation series (Gaio and Raposo, 2011).

3.3.1.4 Earnings Smoothness

There is a controversy regarding whether or not smoothing is a desirable attribute of earnings. This controversy hinges on two conflicting arguments the first of which suggests that managers opportunistically smooth earnings resulting in earnings that are greater or lower relative to the fundamentals of the business. Leuz et al. (2003) and Bhattacharya et al. (2003), among others, adopt this view and argue that earnings smoothing is indicative of accounting that obscures information about economic volatility, resulting in accounting earnings that fail to depict the true swing in underlying firm performance.

However, the view that managers use their private information about future income to smooth out transitory fluctuations and thereby achieve a more representative and useful reported earnings number supports the attractiveness of earnings smoothness as a positive attribute of earnings. For example, using the modified Jones' (1991) model, Chaney et al. (1998) suggest that discretionary accruals are used to smooth earnings and interpret their findings as evidence of management's use of discretionary accruals to communicate information about the firm's long-term (permanent) earnings to equity market, potentially decreasing information asymmetry (see, also, Dechow, 1994; Dechow et al., 1998). In line with the position taken for within-country (US firm) studies of earnings management, our position in this study is that earnings smoothness is a desirable attribute of earnings.

Wyscoki (2004) argues that while the use of discretionary accrual models in measures of earnings smoothness controls for firm and industry characteristics they fail to identify a benchmark for the underlying "economic income" that is being managed. He suggests a measure of earnings smoothness based on the closeness-to-cash as a benchmark because it provides a direct benchmark for the absolute magnitude of "economic income." Following Leuz et al. (2003), we define earnings smoothness as the ratio of income variability to cash flows variability. Specifically, using cash flows as the reference construct, we measure earnings smoothness, SMOOTH, as the bank-specific standard deviation of operating income to standard deviation of operating cash flows:

$$SMOOTH_{i,t} = \frac{\sigma(NIBE)}{\sigma(CFO)}, \tag{3.3.4}$$

where NIBE is the net income before extraordinary items and CFO is the cash flows from operations; both NIBE and CFO are deflated by total assets. Given that loan loss provisions account for the largest proportion of accruals in the banking industry and consistent with previous research on bank earnings quality (e.g. Wahlen, 1994; Kanagaretnam et al., 2004), we construct our cash flow measure as the sum of loan loss provisions and earnings before tax. We estimate Equation 3.3.4. for each bank quarter using a ten-quarter rolling window.

Ratios below one indicate more variability in operating cash flow relative to variability in earnings, which implies more tendencies to use accruals (loan loss provisions) to smooth earnings. That is, a lower ratio indicates more smoothing of the earnings stream relative to cash flows. Thus, higher values of SMOOTH indicate less earnings smoothness. To be consistent with other measures in this study, we take the negative of SMOOTH such that higher values of SMOOTH indicate higher earnings smoothness, higher earnings quality and lower information risk.[12]

3.3.1.5 Composite Earnings Quality Score

We investigate the relation between the specified capital market consequences and individual as well as aggregate earnings quality score (EQS), an unweighted uni-dimensional measure of earnings quality incorporating the four sub-dimensions discussed above. We perform the aggregation for two reasons. First, to the extent that the set of measures capture different dimensions of earnings, intuitively each measure should add to the overall improvement in information from reported accounting earnings. As we show later in Section 3.3.2 of this study, even though most of our measures of earnings quality are reasonably correlated with each other the low correlations between different pairs suggest that they capture different dimensions of earnings quality. Second, to the extent that each of our attributes measure the same underlying phenomenon with (uncorrelated) measurement error, our composite earnings quality measure will suffer less from measurement error relative to each of the individual measures.[13]

We derive a composite measure of earnings quality (EQS) in two ways: First, we rank

[12] We also use alternative smoothness measures. For example, we use the coefficient of earnings before loan loss provisions from the regression of loan loss provisions on earnings before loan loss provisions and other control variables (e.g. Fonseca and Gonzalez, 2008). Our results are similar.

[13] See, also, Bhattacharya et al. (2003) and Leuz et al. (2003) for similar arguments.

all raw time series measures of earnings quality at the end of the fiscal year end (quarter 4) across banks and years into deciles. Higher ranks are associated with greater earnings quality. Hence, we assign each earnings dimension for each bank a rank ranging between 1 and 10, depending on which decile of earnings quality dimension the bank appears for that year. For example, we rank all raw time series measures of PERSIST across banks and years, into deciles; a rank of 5 for bank i on PERSIST in, say, year 2000 means that bank i was in the fifth decile of the PERSIST measure across all banks and across all years. For each bank-year, we then sum all the ranks of individual earnings quality measures to form a time series composite earnings quality score (EQS). Therefore, the maximum (minimum) possible earnings quality score for each bank-year is 40 (4). We also perform a principal component analysis, which suggests the use of the first two principal components. However, as the results are qualitatively similar, we report only the results from the simple aggregation of the individual earnings quality ranks. As with the individual earnings quality measures, EQS is increasing in quality of earnings.

3.3.2 Data Sources and Sample Selection

The study sample is restricted to the US banking industry. Apart from being in line with the scope of the thesis, the restriction of the sample to the banking industry increases the homogeneity of the sample while also serving as a holdout sample to compare, where possible, with other similar studies on industrial firms. We obtain the financial data to construct measures of earnings quality and other bank characteristics from Compustat Bank (quarterly and annual) database, which consists of US publicly traded banks.[14] This database provides the initial sampling frame of 16,300 (1898) bank-year (bank) observations for the 20-year sample period, starting 1990 and ending 2009. We start from 1990 because data to calculate earnings quality proxies were not available for a substantial proportion of banks before this date. We focus on banks included in Compustat Bank because the issues that we study require that the banks are publicly traded companies.

We obtained analyst consensus forecasts of earnings, dividends, and long-term growth in earnings, required to calculate implied cost of equity, from the IBES database through DATASTREAM.[15] We require that banks have earnings forecasts data for year one and

[14] We appreciate the existence of bank regulatory data from the Federal Reserve System (Form FR-9 C). However, as empirical findings already confirm that these data correlate strongly with the Compustat Bank database, we do not explore the possibility of using these regulatory data. For example, Beatty et al. (2002) report a 99.34% correlation between net income figures from both databases.

[15] Results presented in this study are based on mean consensus forecasts. However, results are similar using the median consensus forecasts.

year two at the end of each fiscal year. However, where earnings forecast data are not available for year two, but are available for year one, we use the growth rate in earnings from IBES to estimate the earnings forecast for year two. In addition, consistent with prior studies (e.g. Easton and Monahan, 2005), we impose non-negativity restriction on one and two-year ahead consensus earnings per share forecasts but do not require that a bank has data to estimate all our alternative cost of equity measures as this restriction is implied by the overall cost of equity measure. This allows us to validate the individual cost of equity measures with as large sample size as possible before calculating the overall cost of equity (COE) as an average of these estimates. As shown in Table 3.1, these requirements reduce our bank-year observations by 13,692 for the cost of equity study. We collect additional bond yield data that we use to estimate Claus and Thomas' (2001) and Gode and Mohanram's (2003) cost of equity models from the website of the Federal Reserve Bank.[16]

To be included in the next round of sampling, we also require that banks have available, on CRSP, stock market data to construct market beta, Tobin's Q, and market to book ratio. As we allow our sample to vary depending on the issue that we study, the requirements reduce our sample further by 314, 5653, and 2468 for the cost of equity, bank valuation, and value relevance subsample, respectively. In the third round of sampling, we require that each bank has, at least, 11 bank-quarter income statement and balance sheet information for a number of accounting variables, including total assets, gross loans, loan loss allowance, provision for loan losses, non-performing loans, income before extraordinary items, common equity, and net charge-off that we use in constructing earnings quality measures. We also impose a non-negativity constraint on the book value of equity. The accounting data requirements limit our sample further by 378, 5132, and 5007 for the cost of equity, bank valuation, and value relevance subsample, respectively. Our final sample consists of 422 (1916), 1524 (5515), and 1708 (8825) bank (bank-year) observations for cost of equity, bank valuation, and value relevance subsample, respectively.[17]

[16] http://www.federalreserve.gov/Releases/H15/

[17] The average number of bank-year observations per bank is about 5, 4, and 5 years for the cost of capital, bank valuation and value relevance subsamples, respectively.

Table 3.1: Sample Construction

	Implied Cost of Equity Proxies							
Compustat Bank	r_{pe}	r_{peg}	r_{ct}	r_{gm}	r_{mpeg}	COE	BV	BVR
Number of Banks	1898	1898	1898	1898	1898	1898	1898	1898
Bank-year Observations	16300	16300	16300	16300	16300	16300	16300	16300
Bank-year Obs. deleted :								
Missing IBES Data	(12168)	(11396)	(13165)	(11989)	(11926)	(13692)		
Missing CRSP Data	(505)	(672)	(398)	(539)	(551)	(314)	(5653)	(2468)
Bank-year Observations	3627	4232	2737	3772	3823	2294	10647	13832
Bank-year Observations deleted:								
Missing Compustat Bank Data						(378)	(5132)	(5007)
Bank-year Observations						1916	5515	8825
Number of Banks						422	1524	1708

The table presents sampling procedure for the construction of study samples: r_{pe} is the price-forward-earnings ratio (Easton, 2004), r_{peg} is the price-earnings-growth implied cost of equity model (Easton, 2004), r_{ct} is the Claus and Thomas (2001) implied cost of equity model, r_{gm} is the Gode and Mohanram (2003) implied cost of equity model, r_{mpeg} is the modified price-earnings-growth implied cost of equity model (Easton, 2004). Columns labelled COE, BV, and BVR refer to the sampling stages in the construction of the cost of equity, bank valuation, and bank value relevance study samples, respectively.

3.4 Bank Earnings Quality and the Cost of Equity

In this section, we provide evidence regarding the relation between the cost of equity and earnings quality. Section 3.4.1 presents the empirical model that we use in the study. Section 3.4.2 discusses the methods that we follow in measuring and validating bank cost of equity measures while Section 3.4.3 presents the empirical evidence linking bank cost of equity and earnings quality.

3.4.1 The Model

We test our hypothesis regarding the relation between the cost of equity and earnings quality by examining the impact on the cost of equity of the variation in individual and composite earnings quality measures. Specifically, we perform regressions of the implied cost of equity measures on market beta, bank size, book to market value, and earnings quality measures.[18] That is:

[18]Using the decile rank of the earnings quality measures produces qualitatively similar conclusions

$$COE_{i,t} = \beta_0 + \beta_1 EQ_{i,t} + \beta_2 BETA_{i,t} + \beta_3 LnMVAL_{i,t} + \beta_4 LnBM_{i,t} + \varepsilon_{i,t} \quad (3.4.1)$$

where i and t are the bank and time subscripts, respectively; COE is the cost of equity obtained as the average of the individual cost of equity measures and EQ is one of the following earnings quality measures: ABACC, PERSIST, PREDICT, SMOOTH, and EQS. In other words, we only allow each individual earnings quality measure to enter the regression one at a time while we allow for any possible measurement error or omitted variable problem by using the composite earnings quality score (EQS).

While our primary interest is the EQ variable, we include BETA in the model to control of systematic risk (Sharpe, 1964).[19] We estimate BETA from the regression of stock returns on value-weighted market returns using a minimum of 18 monthly data over the prior 60 months to the fiscal year end. Consistent with the literature, we expect a positive relation between BETA and COE. We include LnMVAL to control for the size effect and mitigate any potential omitted variable problem as past studies suggest a significant association between market value and expected returns (e.g. Berk, 1995) and between market value and one or more earnings quality attributes (e.g. Dechow and Dichev, 2002). We measure LnMVAL as the natural log of the market value of outstanding common shares at the end of the bank fiscal year. We expect a negative relation between LnMVAL and COE, as smaller banks should have larger cost of equity. Finally, we include the logarithm of book to market (LnBM) as evidence suggests a role for book to market in asset pricing. In line with previous studies (e.g. Fama and French, 1993), we expect a positive loading on LnBM.

3.4.2 The Cost of Equity Capital: Measurement and Validation

There has been an explosion in the expected return proxies employed in the empirical accounting and finance literature since 2005 (Botosan et al., 2011). Yet, many, if not all, of these measures differ from the underlying construct in predictable ways (Hughes et al., 2009), contain significant measurement error (Easton and Monahan, 2005) and are therefore unavoidably unreliable (Fama and French, 1997). Studies providing assessments of the different measures are also inconsistent in their guidance. For example, Botosan and Plumlee (2005, 2011), using the association between cost of equity proxies and firm risk characteristics as their benchmark, suggest the use of Botosan and Plumlee's (2002)

[19] See, also, Lintner, 1965 and Black, 1972

target price method (r_{div}) and Easton's (2004) price-earnings growth (r_{peg}) over other alternative proxies that they assess. However, Easton and Monahan (2005), using a linear return decomposition approach and regressing realized returns on proxies for cash flows, expected return news, and seven expected return estimates, report a gloomy prospect for all the proxies, most especially the price-earnings growth ratio. They attribute the weaknesses of these measures to poor quality of analyst forecasts, which are characterised by high consensus long-term growth and significantly inaccurate earnings and dividend forecasts.

In view of the limitations of the cost of equity measures and the potential measurement errors resulting from these, we draw conclusion on the relation between the cost of equity capital and earnings quality using the average of five implied cost of equity measures. Specifically, we use the price-forward earnings ratio (r_{pe}), the price-earnings growth method (r_{peg}), the modified price-earnings growth method (r_{mpeg}), Claus and Thomas' method (r_{ct}), and Gode and Mohanram method (r_{gm}).[20] The basic idea of the last three models is to substitute price and analyst forecasts into a valuation equation and to derive the cost of equity as the internal rate of return that equates current stock price with the expected future series of residual incomes or abnormal earnings. Primarily, the individual models differ with respect to the use of analyst forecasts data, the assumptions regarding growth, dividends, the explicit forecast horizon, and the handling of inflation in the steady-state terminal value. Table 3.2 presents the models along with the definitions of their input variables. We solve the last three models through an iterative process using Excel Solver by setting the minimum (maximum) value of cost of equity to 5% (100%).

The price-forward-earnings ratio is a "naive" cost of equity measure that relies on short-term earnings forecasts that are restricted to a two-year forecast horizon. Through its simplistic assumption that sets the earnings growth rate equal to the cost of equity after year 2, the method implicitly mitigates the restrictive assumption concerning the growth in earnings that is, in part, the bane of the more sophisticated methods. We include this "naive" measure as Easton and Monahan (2005, 501) report that it 'contains no more, and often less, measurement error', than other proxies they examine. The price-earnings growth ratio (Easton, 2004) is a derivation from the fundamental dividend valuation model and assumes that the growth in abnormal earnings over the forecast horizon is zero and that expected one-year-ahead dividends are zero. Under these assumptions, Easton (2004) notes that the discounted dividend model equates the price-earnings growth model

[20] We do not use the very popular Capital Asset Pricing Model in estimating the cost of equity as CAPM does not allow for a premium to the cost of equity due to firm-specific information (see, also, Botosan, 1997; Poshakwale and Courtis, 2005).

(see Model 2 of Table 3.2). In addition, Easton (2004) shows that if the assumption underlying r_{peg} - that expected dividends in year 1 are zero - is relaxed a modified form of the price-earnings growth ratio (r_{mpeg}) as presented in Model 3 of Table 3.2 results.

Table 3.2: Implied Cost of Equity Models

Model 1	$p_{i,t} = \frac{eps_{i,t+1}+r_{pe}\times dps_{i,t}+eps_{i,t+2}}{(1+r_{pe})^2-1}$
Model 2	$r_{peg} = \sqrt{\frac{eps_{i,t+2}-eps_{i,t+1}}{p_{i,t}}}$
Model 3	$p_{i,t} = \frac{eps_{i,t+2}+r_{mpeg}\times dps_{i,t}-eps_{i,t+1}}{r_{mpeg}{}^2}$
Model 4	$p_{i,t} = bps_{i,t} + \sum_{\tau=1}^{4} \frac{(roe_{i,t+\tau}-r_{ct})\times bps_{i,t+\tau-1}}{(1+r_{ct})^{\tau}} + \frac{(roe_{i,t+5}-r_{ct})\times bps_{i,t+4}\times(1+\gamma)}{(r_{ct}-\gamma)\times(1+r_{ct})^4}$
Model 5	$p_{i,t} = \frac{eps_{i,t+1}}{r_{gm}} + \frac{eps_{i,t+2}+r_{gm}\times dps_{i,t}-(1+r_{gm})\times eps_{i,t+1}}{r_{gm}(r_{gm}-g)}$

The table presents valuation models for the estimation of implied cost of equity. r_{pe} is the price-forward-earnings ratio (Easton, 2004), r_{peg} is the price-earnings-growth (Easton , 2004), r_{mpeg} is the modified price-earnings-growth (Easton, 2004), r_{ct} is the Claus and Thomas' (2001) implied cost of equity model, r_{gm} is the Gode and Mohanram's (2003) implied cost of equity model. g is the yield on a ten-year government bond (Federal Reserve Bank) less 3 percent. roe=$eps_{i,t+\tau}/bps_{i,t+\tau-1}$ where $eps_{i,t+\tau} = eps_{i,t+2}\times(1+LTF_i)^{\tau-2}\forall\tau>2$. $bps_{i,t+\tau} = bps_{i,t+\tau-1}+eps_{i,t+\tau}\times(1-K)$. For profitable banks $K = max(0,min(dps_{i,t}/eps_{i,t},1)$. For loss making banks $K = max(0,min(dps_{i,t}/(0.06\times bps_{i,t}),1))$. LTF is the long run forecast of growth in earnings per share from IBES; bps is the book value share (Compustat Bank- seq/csho). $p_{i,t}$ is the closing share price for fiscal year (CRSP-absolute value prc), $eps_{i,t}$ is the actual earnings per share for year t (Compustat Bank: ibcom/csho), eps_{t+1} ($eps_{i,t+2}$) is the mean earnings per share forecast for year t+1 (t+2) from IBES. Missing forecasts for $eps_{i,t+2}$ are replaced by $eps_{i,t+1}\times(1+LFT_i)$. All banks must have positive values for $bps_{i,t}$ and $bps_{i,t+1}$ and $eps_{i,t+2}$ must be greater than $eps_{i,t+1}$.

A criticism of price-earnings-growth ratio and modified price-earnings-growth ratio is the restrictive assumption regarding the constant abnormal growth in earnings. The Gode and Mohanram (2003) model, which is a modification of Ohlson and Juettner-Nauroth (2005) model, avoids this criticism by assuming that the abnormal growth rate in earnings increases after year 1 but is a cross-sectional constant equal to the difference between the risk-free rate of interest and 3 percent - their proxy for inflation rate. Finally, Claus and Thomas (2001) model, which is derived from the residual income model, assumes that earnings grow at the analysts' consensus long-term growth rate until year 5. However, earnings after year 5 grow at the rate of inflation, which is set equal the risk-free rate less 3 percent.

As we are unaware of any study in banking that draws on these cost of equity measures, we follow the standard practice in the literature by validating the reliability of the proxies.

Botosan et al. (2011) note that existing literature employs two general approaches to assess the validity of alternative proxies of firm-specific cost of equity capital or expected returns. The first approach involves examining the association between the proxy and future realized returns while the second approach focuses on the association between the proxy and contemporaneous risk characteristics of firms. We follow the latter approach in this study by relating each cost of capital measure to BETA, LnMVAL and LnBM, as defined in Section 3.4.1 above.

Panel A of Table 3.3 presents the descriptive statistics of the cost of equity measures. The mean cost of equity ranges between 8% (r_{pe}) and 12% (r_{gm} and r_{mpeg}).[21] Interestingly, the mean values reported in Table 3.3 are similar to those reported by Easton and Monahan (2005, Table 2) for a sample of 15,680 firm-year observations over 1981 to 1998. Two important observations emanate from this comparison. First, if, as literature suggests, banks are more opaque than industrial firms are, this result does not suggest that markets require higher returns to bear any additional risk resulting from such opacity. Thus, the similarity between the means seems to give support to Flannery et al. (2004) who note that 'banking assets are not unusually opaque; they are simply boring,' suggesting that banks may not have to bear additional cost over and above that bore by a non-banking firm. Second, even though our sample period overlaps by just eight years with those of Easton and Monahan (2005), the result suggests that the implied cost of equity capital, at least for banks, has remained relatively stable over time.

Panel B of Table 3.3 presents the correlation matrix for the cost of equity measures and the risk factors. The results show a strong positive correlation between the pairs of the cost of equity measures suggesting that they measure similar underlying construct, The highest correlation is between r_{mpeg} and r_{gm}. Most importantly, as expected, we document positive and significant relation between each cost of equity measure and BETA, the primary risk proxy. However, the correlation matrix provides little evidence that the book to market ratio plays a role in bank cost of equity while, contrary to expectation, bank size exhibits significantly positive correlation with the cost of equity measures.

[21] Since we doubt that a bank's cost of capital would be greater than 50%, we restrict cost of capital measures to a maximum of 50%. This decision affects only 4, 1, and 7 value(s) of r_{gm} , r_{peg} and r_{mpeg}, respectively

Table 3.3: Descriptive Statistics and Correlation Matrix - Cost of Equity and Risk Proxies

Panel A: Descriptive Statistics

	Mean	SD	Min	Max	Q1	Q2	Q3	N
r_{pe}	0.08	0.02	0.05	0.28	0.07	0.08	0.10	4259
r_{ct}	0.09	0.02	0.05	0.24	0.08	0.09	0.10	3222
r_{gm}	0.12	0.04	0.05	0.50	0.10	0.11	0.14	4425
r_{peg}	0.10	0.03	0.05	0.50	0.08	0.09	0.11	5049
r_{mpeg}	0.12	0.05	0.05	0.50	0.09	0.11	0.13	4497
COE	0.10	0.03	0.06	0.41	0.09	0.10	0.12	2686
BETA	0.60	0.42	0.20	3.45	0.25	0.49	0.80	4620
MVAL (US$ billion)	1.93	9.50	0.04	239.76	0.96	0.24	0.79	5482
BM	0.75	0.51	0.03	10.06	0.48	0.64	0.86	5473

Panel B: Correlation Matrix

	r_{pe}	r_{ct}	r_{gm}	r_{peg}	r_{mpeg}	COE	BETA	MVAL	BM
r_{pe}	1								
r_{ct}	0.87***	1							
r_{gm}	0.52***	0.56***	1						
r_{peg}	0.61***	0.62***	0.99***	1					
r_{mpeg}	0.42***	0.52***	0.72***	0.74***	1				
COE	0.73***	0.76***	0.95***	0.97***	0.79***	1			
BETA	0.27***	0.25***	0.22***	0.24***	0.24***	0.31***	1		
MVAL	0.44***	0.40***	0.27***	0.34***	0.36***	0.37***	0.17***	1	
BM	-0.01	0.02	-0.01	-0.01	-0.03**	-0.01	0.11***	-0.07***	1

The table above presents the descriptive statistics and correlation matrix of the cost of equity measures and risk proxies. r_{pe} is the price-forward-earnings ratio (Easton, 2004), r_{ct} is the Claus and Thomas' (2001) implied cost of equity model, r_{gm} is the Gode and Mohanram's (2003) implied cost of equity model, r_{peg} is the price-earnings-growth (Easton , 2004), r_{mpeg} is the modified price-earnings-growth (Easton, 2004). COE is the average cost of equity derived from the five models. By construction, all the implied cost of equity measures are for bank fiscal year $t+1$. All measures of the cost of equity capital are as described in Table 3.2 above. BETA is the measure of market risk and is estimated via the market model by regressing stock returns (CRSP: ret) on value weighted returns (CRSP: vwretd) using a minimum of 18 monthly returns over the prior 60 months to the fiscal year end. MVAL is the market value of equity (CRSP price data- prc mutiplied by CRSP share outstanding data -shrout) at the end of the fiscal year end. BM is the book value of equity (Compustat Bank: seq) to market value of equity. ***,**,* indicate statistically significant at 1%, 5% and 10%, respectively.

To provide additional multivariate support for the cost of equity measures, we also regress each measure against the candidate risk proxies. Our conclusion is similar to those under the univariate analysis using pooled regression and the Fama and MacBeth (1973) regression. As expected, the results show that each cost of equity is increasing in BETA and BM. However, the role of MVAL within the multivariate analyses is both weak

and inconsistent.[22] While the results (using the pooled regressions) show that market beta, bank size, and book to market ratio explain a considerable variation in the cost of equity capital (R-squares range between 13% and 50%), the results also suggest that the included risk factors are not exhaustive in explaining the variation in cost of equity. While other factors, such as noise in the measurement of the cost of equity and risk proxies may explain the low R-squares, we proceed in the next section to evaluate our basic hypothesis, which suggests a missing risk proxy, such as estimation risk as captured by poor information quality (earnings quality).

[22] In an untabulated set of results, we find that each implied cost of equity measure is decreasing in MVAL in models consisting of only BETA and MVAL risk proxies. Thus, the BM variable seems to dominate the MVAL variable for banks in our sample.

Table 3.4: Validation of Cost of Equity Measures

Panel A: Pooled Regression

		r_{pe}		r_{ct}		r_{gm}		r_{peg}		r_{mpeg}		COE	
BETA	+	0.005***	0.005***	0.005***	0.004***	0.007***	0.006***	0.006***	0.004**	0.016***	0.017***	0.009***	0.008***
		(6.05)	(5.50)	(6.14)	(4.39)	(4.15)	(3.42)	(3.21)	(2.32)	(12.21)	(12.46)	(6.87)	(5.78)
LnMVAL	-		0.000		0.001**		0.001		0.001*		-0.001***		0.000
			(0.30)		(2.33)		(1.23)		(1.72)		(-2.98)		(0.55)
LnBM	+		0.014***		0.015***		0.012***		0.014***		0.023***		0.012***
			(15.67)		(15.70)		(6.77)		(7.98)		(15.77)		(8.57)
Intercept	+	0.080***	0.085***	0.089***	0.086***	0.117***	0.112***	0.115***	0.107***	0.088***	0.119***	0.097***	0.100***
		(141.80)	(21.77)	(135.48)	(20.15)	(103.81)	(13.91)	(101.49)	(13.24)	(94.99)	(18.06)	(107.43)	(16.96)
Year Dummy		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.46	0.50	0.34	0.41	0.29	0.30	0.32	0.34	0.13	0.22	0.36	0.38
N		3653	3651	2719	2718	3794	3792	3847	3845	4252	4246	2285	2284

Panel B: Cross-Sectional Regressions

		r_{pe}		r_{ct}		r_{gm}		r_{peg}		r_{mpeg}		COE	
BETA	+	0.004**	0.003*	0.005**	0.004*	0.013*	0.005***	0.011	0.003	0.022***	0.502***	0.007**	0.005
		(2.35)	(1.94)	(2.64)	(1.98)	(1.96)	(3.19)	(1.63)	(0.77)	(3.43)	(4.17)	(2.35)	(1.63)
LnMVAL	-		0.000		0.001		-0.001		-0.000		-0.003		0.000
			(0.05)		(1.02)		(-0.94)		(-0.18)		(-1.39)		(0.12)
LnBM	+		0.015***		0.014***		0.008		0.012*		0.020***		0.008**
			(4.88)		(6.14)		(1.20)		(1.90)		(5.19)		(2.46)
Intercept	+	0.085***	0.089***	0.091***	0.086***	0.115***	0.141***	0.122***	0.132***	0.087***	0.157***	0.102***	0.105***
		(19.19)	(5.35)	(31.33)	(8.34)	(13.58)	(5.78)	(12.70)	(5.53)	(27.83)	(3.73)	(24.47)	(11.53)
Average R^2		0.02	0.15	0.04	0.16	0.07	0.15	0.04	0.11	0.08	0.18	0.06	0.15
N		3651	3651	2718	2718	3792	3792	3845	3845	4246	4246	2284	2284

The table presents the estimates of coefficients (above) and t-statistics (below) of the regression of the cost of equity measures on risk proxies: beta, size, and book to market. r_{pe} is the price-forward-earnings ratio (Easton, 2004), r_{peg} is the price-earnings-growth (Easton , 2004), r_{mpeg} is the modified price-earnings-growth (Easton, 2004), r_{ct} is the Claus and Thomas (2001) model, r_{gm} is the Gode and Mohanram (2003) model. By construction, all implied cost of equity measures are for bank fiscal year $t+1$. All measures of the cost of equity capital are described in Table 3.2 above. COE is the average cost of equity derived from the five models. BETA is the measure of market risk and is estimated via the market model by regressing stock returns (CRSP: ret) on value weighted returns (CRSP: vwretd) using a minimum of 18 monthly returns over the prior 60 months to the fiscal year end. LnMVAL is the natural log of market value of equity (CRSP price data - prc - multiplied by CRSP share outstanding data - shrout) at the end of the fiscal year end. LnBM is the log of book value of equity (Compustat Bank: seq) to market value of equity. ***,**,* indicate statistically significant at 1%, 5% and 10%, respectively.

3.4.3 Empirical Results: Bank Earnings Quality and The Cost of Equity

Panel A of Table 3.5 presents the descriptive statistics for the earnings quality proxies and other variables included in the empirical Model 3.4.1. As discussed earlier, we construct all measures of earnings quality such that a higher value implies higher earnings quality. The mean (median) bank has a market value of US$1.9 billion (US$0.24 billion). The cost of equity for the mean and median bank is 10% suggesting that this variable is normally distributed. The table also shows that the composite earnings quality measure exhibits greater variation than the individual earnings quality measures. The mean (median) bank has an earnings quality score of 22.61 (23.00). The mean (median) bank has a market beta of 0.60 (0.49) and a mean and median book to market value of 0.75 and 0.64, respectively.

We do not provide separate validity tests of our earnings quality measures. However, to provide some insight into the validity of our measures, we note that the bank with the highest level of composite earnings quality is Comerica Inc (cusip 20034010). This bank has as its auditors Ernst and Young, one of the Big 4 accounting firms. The high earnings quality exhibited by this bank is consistent with empirical evidence suggesting that Big 4 clients have higher earnings quality. As noted by Francis and Wang (2008), one explanation for this is that Big 4 clients have smaller abnormal accruals as Big 4 auditors constrain aggressive earnings management through accruals. The positive correlation between earnings quality and Big 4 auditors may also arise because large and more wealthy companies which are more likely to use the Big 4 auditors are also more able to finance costly accounting and internal control measures that promote better earnings quality. On the other hand, one of the two banks with the lowest composite earnings quality measure, Integra Bank Corp (cusip 45814P10) went bust in July 2011. While we make no claim that poor earnings quality explains the bankruptcy of the bank, extant empirical evidence supports the view that the incentive to manage earnings increases with the probability of bankruptcy (e.g. Rosner, 2003).

Panel B of Table 3.5 shows the Pearson correlations of the five earnings quality measures as well as the composite earnings quality measure and other control variables. While a positive correlation between pairs of earnings quality attributes is potentially desired, Dechow et al. (2010) note that low and negative correlations should not be a surprise as though the earnings quality proxies represent properties of the same reported earnings number, they measure different attributes of earnings. The correlation coefficients presented in this table is consistent with their view. Importantly, the table also shows a

low correlation between EQS and all the other candidate risk proxies - BETA, LnMVAL and LnBM - suggesting that earnings quality is a bank characteristic distinct from the specified risk proxies. The generally negative correlation between each earnings quality measure and the implied cost of equity provides a univariate support for the predicted negative relation between earnings quality and the cost of equity.

Table 3.5: Descriptive Statistics and Correlation Matrix - Earnings Quality and Risk Proxies

Panel A: Descriptive Statistics: Risk Proxies and Earnings Quality Dimensions

	Mean	SD	Min	Max	Q1	Q2	Q3	N
SMOOTH	-1.10	1.07	-23.54	-0.02	-1.11	-0.91	-0.70	4409
PERSIST	0.38	0.48	-0.65	1.41	0.00	0.35	0.78	4532
PREDICT	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	4532
ABACC	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	4903
EQS	22.61	6.24	4.00	39.00	18.00	23.00	27.00	4066
BETA	0.60	0.42	0.20	3.45	0.25	0.49	0.80	4647
BM	0.75	0.64	0.03	29.06	0.48	0.64	0.86	5488
MVAL (US$' billion)	1.90	9.50	0.01	239.76	0.10	0.24	0.79	5497
COE	0.10	0.03	0.06	0.41	0.09	0.10	0.12	2679

Panel B: Correlation Matrix: Risk Proxies and Earnings Quality Dimensions

	SMOOTH	PERSIST	PREDICT	ABACC	BETA	EQS	BM	MVAL	COE
SMOOTH	1								
PERSIST	0.10***	1							
PREDICT	0.03**	-0.31***	1						
ABACC	0.10***	0.07***	0.30***	1.00					
BETA	-0.08***	0.11***	-0.08***	-0.00	1				
EQS	0.33***	0.42***	0.41***	0.63***	0.06***	1			
BM	-0.06***	0.02	-0.18***	-0.20***	0.19***	-0.22***	1		
MVAL	-0.03*	0.16***	0.13***	0.15***	0.11***	0.27***	-0.06***	1	
COE	-0.13***	0.04***	-0.14***	-0.10***	0.31***	-0.07***	0.36***	-0.01	1

The table presents the descriptive statistics and correlation matrix of the implied cost of equity measure and risk proxies, including earnings quality measures. SMOOTH is the ratio of standard deviation of net income before extraordinary items (Compustat Bank: ibcomq) to the standard deviation of cash flow from operations (Compustat Bank: coeitq+dpq+pllq) - both variables are standardised by total assets (Compustat Bank: atq). PERSIST is the slope coefficient from the AR(1) model of earnings (Compustat Bank: ibcomq) on lagged earnings - both standardised by total assets. PREDICT is the standard deviation of the error terms from the AR(1) earnings persistent model (Equation 3.3.2). We estimate SMOOTH, PERSIST, and PREDICT using a 10-quarter rolling window. ABACC is the negative of the absolute value of the error term of the non-discretionary loan loss provisions model (Equation 3.3.1), estimated cross-sectionally. EQS is the sum of the ranks of individual earnings quality measures: we rank each raw time series of earnings quality measure at the end of the fiscal year end (quarter 4) across banks and years into deciles - higher ranks are associated with greater earnings quality. BETA is the measure of market risk and is estimated via the market model using a minimum of 18 monthly returns over the prior 60 months to the fiscal year end. Returns data (stock returns - ret- and value weighted returns - vwretd) are from CRSP. MVAL is the market value of equity at the end of the fiscal year end (CRSP absolute price data - prc multiplied by CRSP share outstanding data - shrout). BM is the book value of equity (Compustat Bank: seq) to market value of equity (MVAL). COE is average of five implied cost of equity measures (see Table 2.2). ***,**,* indicate statistically significant at 1%, 5% and 10%, respectively.

Table 3.6: Quintile Analysis - The Implied Cost of Equity and Earnings Quality

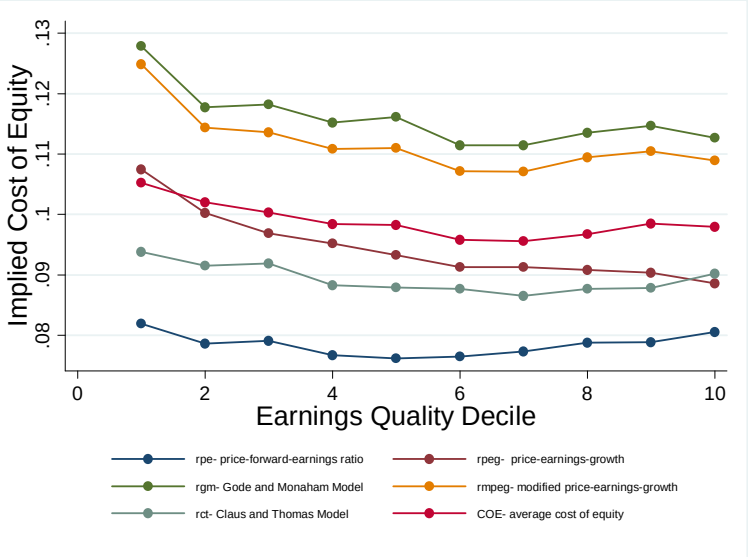
		Mean					
		r_{pe}	r_{peg}	r_{gm}	r_{mpeg}	r_{ct}	COE
Lowest	1	0.0813	0.1069	0.1269	0.1240	0.0941	0.1044
Earnings Quality Decile	2	0.0782	0.0990	0.1166	0.1130	0.0914	0.1017
	3	0.0793	0.0978	0.1192	0.1147	0.0918	0.1001
	4	0.0768	0.0946	0.1140	0.1098	0.0882	0.0982
	5	0.0766	0.0937	0.1165	0.1113	0.0877	0.0984
	6	0.0767	0.0912	0.1117	0.1072	0.0875	0.0959
	7	0.0772	0.0915	0.1114	0.1071	0.0867	0.0957
	8	0.0791	0.0903	0.1128	0.1087	0.0875	0.0966
	9	0.0788	0.0902	0.1147	0.1101	0.0878	0.0985
Highest	10	0.0806	0.0886	0.1125	0.1088	0.0903	0.0979
		Q10-Q1					
t-statistic		-0.4969	-7.0597***	-4.7832***	-5.2100***	-2.2214***	-2.7600***
z-statistic		0.1072	-6.1938***	-4.2193***	-4.5703***	-0.8002	-2.2983***

The table presents the quintile analysis of cost of equity across 10 composite earnings quality (EQS) groups. r_{pe} is the price-forward-earnings ratio (Easton, 2004), r_{peg} is the price-earnings-growth (Easton, 2004), r_{mpeg} is the modified price-earnings-growth (Easton, 2004), r_{ct} is the Claus and Thomas' (2001) implied cost of equity model, r_{gm} is the Gode and Mohanram's (2003) implied cost of equity model. By construction, all implied cost of equity measures are for bank fiscal year $t+1$. COE is the average cost of equity derived from the five models. t-statistic and z-statistic are the test of difference of means and Mann-Whitney test of median respectively. Decile 1 (10) is the least (highest) decile of earnings quality. *** indicates statistically significant at 1%

Table 3.6 also presents the results of the quintile analysis of the mean of the cost of equity measures across earnings quality deciles. In general, the tests of difference in mean (and the untabulated median) support the idea of a negative relation between bank earnings quality and the cost of equity. The results show that the cost of equity of the lowest earnings quality decile is significantly higher than the highest earnings quality decile. The difference in the mean cost of equity ranges between 0.38% (r_{ct}) and 1.83% (r_{peg}). Figure 3.1 shows the relation between the implied cost of equity capital estimates and earnings quality measures grouped into ten deciles. While the relation is definitely not monotonically downward, it seems that there is a negative association between the estimates of the cost of equity and the earnings quality measures, confirming the results in Table 3.7.

The results of the regression of the cost of equity on earnings quality are presented in Panel A (pooled regression) and Panel B (yearly cross-sectional regressions) of Table 3.7.

Figure 3.1: Implied Cost of Equity and Earnings Quality



The results under each of the estimation procedures are quantitatively and qualitatively similar. Consistent with expectation and the univariate analysis reported earlier in this study, in all the models, the coefficients on BETA and LnBM are significantly positive. The coefficient on LnMVAL is insignificantly different from zero in all the earnings quality models.The magnitude of the coefficient on BETA suggests a market risk premium of about 1% which is substantially lower than the reported historical risk premium of between 3 percent (e.g. Claus and Thomas, 2001) and 9 percent (e.g. Ibboston Associates). However, Siegel (1999) notes that many of the studies attempting to estimate risk premium overstate the premium by understating the real return on fixed-income assets and overstating the expected return on equities.

Columns for Model 9 and Model 10 of Table 3.7 show the results of estimating our empirical model using the composite earnings quality measure (EQS). Consistent with expectation the coefficient on EQS is significantly negative and suggests a reduction of 0.1 percentage (10 basis) point in the cost of equity even after controlling for market beta, bank size, and book to market ratio. However, the results suggest that the predictability and accruals quality variables seem to drive the reported negative relation between earnings quality and the cost of equity. Specifically, we find a mild support for a positive relation between the cost of equity and earnings quality, as measured by the persistence variable and, consistent with McInnis (2010), we find no relation between cost of equity

and earnings smoothness after controlling for market beta, bank size, and book to market ratio.In untabulated results we repeat the analyses using the values of the earnings quality measures instead of the ranks. Our results are consistent with those reported in Table 3.7.

Panel B of Table 3.7 shows the results of estimating the empirical model using yearly cross-sectional regressions (Fama and MacBeth, 1973). Consistent with the pooled regression results, we find that a significantly negative relation between earnings quality and cost of equity. However, this relation seems driven by the predictability variable. While the coefficients on ABACC and SMOOTH is insignificantly negative, as with the pooled regression result, the coefficient on PERSIST is positive but insignificant.

Two practical implications emanate from the results reported in Table 3.7. While our aggregate earnings quality measure exhibits a significant negative relation with the cost of bank equity, our results show that relative to similar studies on industrial firms the impact of earnings quality on the cost of equity is less economically significant. This result calls into question the often-held view that banks are inherently more informational opaque than industrial firms are. Perhaps, the mitigating role of bank regulation and supervision on information asymmetry explains the relatively weak economic significance of information quality. In addition, our results also suggest that better information does not necessarily result in lower cost of equity for banks. The relation between earnings quality and the cost of equity is contingent on the dimension of earnings quality. This is consistent with the view that the release of more and better information is associated with frequent trading in shares and higher price volatility (risk).

Table 3.7: Regression Results - The Implied Cost of Equity and Earnings Quality

Panel A: Pooled Regression

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
BETA	+		0.008***		0.008***		0.008***		0.008***		0.008***
			(4.83)		(4.87)		(4.85)		(4.83)		(4.86)
LnMVAL	-		0.000		0.000		0.000		0.000		0.000
			(0.08)		(1.12)		(0.77)		(1.40)		(1.47)
LnBM	+		0.011***		0.012***		0.011***		0.012***		0.011***
			(8.30)		(8.43)		(8.18)		(8.51)		(8.27)
PERSIST	-	0.000	0.000**								
		(1.57)	(2.00)								
ABACC	-			-0.000**	-0.000**						
				(-2.00)	(-2.40)						
SMOOTH	-					-0.000**	-0.000				
						(-2.27)	(-1.15)				
PREDICT	-							-0.001***	-0.001***		
								(-3.19)	(-3.54)		
EQS	-									-0.001***	-0.001***
										(-3.06)	(-2.70)
Intercept	+	0.097***	0.098***	0.100***	0.095***	0.100***	0.096***	0.096***	0.094***	0.101***	0.092***
		(98.91)	(16.41)	(89.16)	(15.99)	(94.55)	(16.15)	(76.61)	(15.80)	(99.43)	(15.15)
Year Dummy		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.25	0.30	0.25	0.30	0.25	0.29	0.27	0.30	0.26	0.30
N		1916	1916	1916	1916	1916	1916	1916	1916	1916	1916

Table 3.7 - continues on next page

Table 3.7 continued
Panel B: Yearly Cross-sectional Regressions

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
BETA	+		0.006***		0.007***		0.006***		0.006***		0.006***
			(3.47)		(3.50)		(3.15)		(3.41)		(3.43)
LnMVAL	-		0.001		0.001		0.001		0.001		0.002*
			(1.35)		(1.61)		(1.50)		(1.70)		(1.95)
LnBM	+		0.004		0.005		0.004		0.005		0.005
			(1.06)		(1.48)		(1.00)		(1.28)		(1.24)
PERSIST	-	0.000	0.000								
		(0.20)	(0.04)								
ABACC	-			0.000	-0.000						
				(0.07)	(-0.80)						
SMOOTH	-					-0.000	-0.000				
						(-1.44)	(-1.62)				
PREDICT	-							-0.000	-0.001		
								(-1.40)	(-1.71)		
EQS	-									-0.000	-0.001**
										(-1.25)	(-2.93)
Intercept	+	0.099***	0.077***	0.100***	0.072***	0.103***	0.075***	0.103***	0.073***	0.102***	0.066***
		(29.83)	(5.10)	(33.13)	(4.22)	(28.17)	(4.91)	(26.59)	(4.72)	(33.49)	(3.84)
Average R^2		0.02	0.13	0.02	0.13	0.01	0.13	0.02	0.13	0.02	0.13
N		1916	1916	1916	1916	1916	1916	1916	1916	1916	1916

The table shows the estimates of coefficients (above) and t-statistics (below) of the regression of the cost of equity (COE) on earnings quality measures. SMOOTH is the ratio of standard deviation of net income before extraordinary items (Compustat Bank: ibcomq) to the standard deviation of cash flows from operations (Compustat Bank: coeitq+dpq+pllq) - both variables are standardised by total assets (Compustat Bank: atq). PERSIST is the slope coefficient from the AR(1) model of earnings (Compustat Bank: ibcomq) on lagged earnings - both standardised by total assets. PREDICT is the standard deviation of the error terms from the AR(1) earnings persistent model (Equation 3.3.2). We estimate SMOOTH, PERSIST, and PREDICT using a 10-quarter rolling window. ABACC is the absolute value of the error term of the non-discretionary loan loss provisions model (Equation 3.3.1), estimated cross-sectionally. EQS is the sum of the ranks of individual earnings quality measures: we rank each raw time series of earnings quality measure at the end of the fiscal year end (quarter 4) across banks and years into deciles - higher ranks are associated with greater earnings quality. BETA is the measure of market risk and is estimated via the market model using a minimum of 18 monthly returns over the prior 60 months to the fiscal year end. Returns data (stock returns (ret) and value weighted returns (vwretd)) are from CRSP. COE is average of five implied cost of equity measures (see Table 2.2). LnBM is the natural log of book of equity (Compustat Bank: seq) to market value of equity (CRSP - absolute value of prc - multiplied by CRSP - share outstanding - shrout). LnMVAL is the natural log of market value of equity at the end of the fiscal year end. ***,**,* indicate statistically significant at 1%, 5% and 10% respectively. The reported coefficient on each variable is the mean of the time series distribution of coefficients for that variable. The reported t-statistics for the time series distribution of a coefficient is obtained as the mean coefficient divided by its standard deviation and multiplied by the square root of the number of cross sections. The model R-square is the mean of the time series distribution of R-squares.

3.5 Earnings Quality and Bank Valuation

In this section, we investigate the relation between market valuation of banks and earnings quality (H2). To recap, theoretical and empirical evidence on the effect of earnings quality on the cost of capital suggests that low quality earnings results in higher information risk and higher cost of capital. As the firm's market price is the present value of expected current and future cash flows discounted at the risk-adjusted cost of capital, all else equal, a reduction in a firm's cost of capital should result in an increase in firm value. Therefore, banks with higher earnings quality should enjoy higher valuation, suggesting a positive relation between bank value and earnings quality.

To assess the impact of earnings quality on bank valuation, we regress measures of bank valuation on individual measures of earnings quality, the overall earnings quality score and a number of control variables. Specifically, we test the hypothesis of a positive relation between bank valuation and earnings quality by estimating the following pooled cross-sectional and time series regression model:

$$\begin{aligned} Q_{i,t} &= \alpha_0 + \beta_1 EQ_{i,t} + \beta_2 LnSIZE_{i,t} + \beta_3 INVOPP_{i,t} + \beta_4 LnAGE_{i,t} \\ &\quad + \beta_5 ROA_{i,t} + \beta_6 ROA_{i,t-1} + \beta_7 CAP_ASSET_{i,t} + \beta_8 LLPR_{i,t} \\ &\quad + \beta_9 LQD_{i,t} + Year\ Controls + \varepsilon_{i,t} \end{aligned} \tag{3.5.1}$$

where i and t are the bank and year subscripts, respectively; Q is the bank value, EQ is the individual or aggregate earnings quality measure for bank i in year t.

Our primary measure of bank valuation (Q) is the Tobin's Q which is a widely used valuation proxy in studies on corporate governance (e.g. Gompers et al., 2003; Caprio et al., 2007), corporate diversification (e.g. Lang and Stulz, 1994) and investor protection (e.g. La Porta et al., 2002). Tobin's Q, the market valuation of bank i assets-in-place and growth opportunities, is defined as the ratio of market value to replacement cost of assets. A value higher than one indicates that the bank is using its resources efficiently and creating positive economic value that reflects in its market value. Assuming financial markets are efficient and that market value is an unbiased estimate of the present value of a firm's future cash flows (Gaio and Raposo, 2011), we interpret Tobin's Q as the market long-run valuation of a bank's economic returns generated from the use of its assets (Bitner and Dolan, 1996). However, because of the practical difficulty of obtaining replacement value of assets, we calculate Tobin's Q as the ratio of market value of equity

plus the book value of liabilities to the book value of assets.[23] Because banks are highly levered, following Caprio et al. (2007), we also use a second measure of bank value obtained as the ratio of market value of equity to book value of equity.

Equation 3.5.1 controls for a number of variables. These variables cover the bank-specific CAMEL characteristics used in the assessment of bank soundness and have significant influence on bank valuation and, possibly, earnings quality.[24] Studies report a positive impact of investment opportunities (INVOPP) on the valuation of banking and non-banking firms. We measure INVOPP as the annual change in bank revenue, defined as the sum of interest and non-interest income. However, as with other alternative accounting based measures, this measure may not perfectly capture investment opportunities as it relies on accounting data that are subject to managerial manipulation and provide little or no information about the market valuation of growth options.[25] Empirical evidence suggests that smaller and younger firms have lower market valuation but greater investment opportunities while older firms have better earnings quality (and internal control) thus suggesting an important role for bank size and age. We measure bank size (LnSIZE) as the log of total assets and bank age (LnAGE) as the log of the number of quarters between 1961 and 2009 that the bank appears in Compustat Bank database.

We also control for bank risk and capital adequacy as banks with low equity to asset ratio are closer to insolvency and should enjoy lower market valuation predicting a positive relation with Q. We measure capital-asset ratio (CAP_ASSET) as the ratio of capital to total assets. We define capital as the combination of Tier 1 and Tier 2 capital. The model also controls for the liquidity structure (LQD) of banks. We measure bank liquidity as the ratio of cash and due from bank to total assets and predict a positive relation with Q as banks with higher liquidity should have lower risk and better able to take advantage of investment opportunities that generate greater benefits. We control for bank performance using the current and lagged returns on asset (ROA), defined as the ratio of income before tax to total assets. We predict a positive relation between bank

[23] Our measure is strongly correlated with two other measures of Tobin's Q that we identify from the literature: (1) the ratio of book value of assets plus market value of equity minus deferred tax, where available, plus book value of equity to book value of assets, and (2) the ratio of the sum of total assets and market value of equity less book value of equity to total assets. This is not surprising as the values of deferred tax are largely missing and set to zero in our analysis. Notwithstanding the strong correlations, we acknowledge that as in many studies Tobin's Q is measured with error (e.g. due to mispricing).

[24] CAMEL is an acronym for capital adequacy, asset quality, management, earnings, and liquidity, which are supervisory and regulatory criteria for the assessment of banks.

[25] Our results do not change if we use the rate of growth in loans.

Table 3.8: Descriptive Statistics and Correlations - Earnings Quality and Bank Characteristics

Panel A: Descriptive Statistics

	Mean	SD	Min	Max	Q1	Q2	Q3	N
TQ	1.03	0.08	0.01	3.40	0.99	1.02	1.07	9447
MTB	1.54	0.86	0.04	30.33	1.02	1.40	1.89	9444
EQS	21.75	5.93	4.00	39.00	18.00	22.00	26.00	6740
PERSIST	0.34	0.47	-0.65	1.41	-0.02	0.29	0.71	6739
PREDICT	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	7620
SMOOTH	-1.11	1.12	-33.86	-0.02	-1.13	-0.94	-0.72	6591
ABACC	-0.00	0.00	-0.02	-0.00	-0.00	-0.00	-0.00	8282
SIZE (US$' billion)	8.22	61.34	0.02	2223.30	0.41	0.90	2.74	9503
INVOPP	0.03	0.07	-0.68	1.44	0.00	0.03	0.05	8898
AGE	65.21	34.75	7.00	192.00	43.00	57.00	87.00	9503
ROA	0.00	0.01	-0.48	0.08	0.00	0.00	0.00	9406
ROAlg1	0.00	0.01	-0.08	0.08	0.00	0.00	0.00	8927
CAP_ASSET	0.03	0.07	0.00	1.50	0.01	0.02	0.04	8395
LLPR	0.07	0.21	-0.89	5.77	0.01	0.03	0.06	9015
LQD	0.04	0.03	0.00	0.39	0.02	0.03	0.05	9329

Panel B: Correlation Matrix

	TQ	MTB	EQS	PERSIST	PREDICT	SMOOTH	ABACC	SIZE	INVOPP	AGE	ROA	ROAlg1	CAP_ASSET	LLPR	LQD
TQ	1														
MTB	0.91***	1													
EQS	0.18***	0.24***	1												
PERSIST	0.04***	0.07***	0.25***	1											
PREDICT	0.10***	0.11***	0.40***	-0.16***	1										
SMOOTH	0.10***	0.10***	0.19***	0.07***	0.01	1									
ABACC	0.16***	0.17***	0.41***	-0.03***	0.33***	0.04***	1								
SIZE	-0.08***	0.02**	0.18***	0.12***	0.08***	-0.03**	0.05***	1							
INVOPP	0.14***	0.13***	0.06***	0.04***	0.00	0.06	0.15	0.04	1						
AGE	0.11***	0.20***	0.29***	0.18***	0.12***	-0.03***	0.09***	0.30***	0.07***	1					
ROA	0.20***	0.16***	0.20***	-0.04***	0.14***	0.03**	0.36***	-0.01	0.28***	0.06***	1				
ROAlg1	0.23***	0.19***	0.13***	-0.03**	0.07***	0.06***	0.21***	-0.01	0.11***	0.04***	0.23***	1			
CAP_ASSET	-0.15***	-0.18***	-0.10***	-0.11***	0.02**	-0.19***	0.04***	-0.06***	-0.11***	-0.26	0.02**	0.03***	1		
LLPR	-0.14***	-0.10***	-0.19***	0.10***	-0.24***	-0.05***	-0.59***	0.06***	-0.21***	0.02	-0.45***	-0.18***	-0.08***	1	
LQD	0.01	0.03***	0.04***	0.07***	-0.02**	-0.05***	-0.02*	0.04***	-0.01***	0.19***	-0.01	-0.03***	0.11***	0.03***	1

The table presents the descriptive statistics and correlation matrix of regression variables in Equation 3.5.1. TQ (Tobin's Q ratio) is calculated as the ratio of market value of equity (CRSP: absolute value prc×shrout) plus total liabilities (Compustat Bank: total liabilities (tb)) plus deposit (Compustat Bank: dptcq) to book value of assets (Compustat Bank: at). MTB is the ratio of market value of equity to book value of equity. Market value of equity is the product of market price per share (CRSP: absolute value prc) and number of shares outstanding (CRSP: shrout). SMOOTH is the ratio of standard deviation of net income before extraordinary items (Compustat Bank: ibcomq) to the standard deviation of cash flows from operations (Compustat Bank: coeitq+dpq+pllq) - both variables are standardised by total assets (Compustat Bank: atq). PERSIST is the slope coefficient from the AR(1) model of earnings (Compustat Bank: ibcomq) on lagged earnings - both standardised by total assets. PREDICT is the standard deviation of the error terms from the AR(1) earnings persistent model (Equation 3.3.2). We estimate SMOOTH, PERSIST, and PREDICT using a 10-quarter rolling window. ABACC is the negative of the absolute value of the error term of the non-discretionary loan loss provisions model (Equation 3.3.1), estimated cross-sectionally. EQS is the sum of the ranks of individual earnings quality measures: we rank each raw time series of earnings quality measure at the end of the fiscal year end (quarter 4) across banks and years into deciles - higher ranks are associated with greater earnings quality. SIZE is the total assets. INVOPP is investment opportunity given by annual growth in bank revenue (the sum of interest and non-interest income). AGE is a measure of the bank age, given by the log of number of quarters a bank appears in the Compustat Bank database between 1961 and 2009. ROA is a measure of bank performance (profitability), given by the ratio of income before tax (Compustat Bank: ibcom) to total assets. ROAlag1 is the return on assets for the previous fiscal year. CAP_ASSET is the capital to assets ratio. LLPR is the ratio of loan loss provisions to total assets and LQD is the ratio of current assets to total assets. Current assets are defined as cash and due from banks. All variables are computed at the end of each fiscal year. The sample period is from 1990-2009. ***, **, * indicate statistically significant at 1%, 5%, and 10%, respectively.

value and current and past performance. We control for loan quality (LLPR) measured as the ratio of loan loss provisions to total assets. The lower the ratio the higher the quality of loans and all else equal the higher the bank value, suggesting a negative relation between LLPR and measures of bank valuation. Finally, Equation 3.5.1 includes year dummies that control for potential year-to-year variation.

Panel A of Table 3.8 reports the descriptive statistics of the distribution of bank valuation, earnings quality and other control variables that enter into our regression models. For the purpose of this table, we winsorize values of each measure at the lower and upper 1% to mitigate the impact of outliers. The mean (median) bank in the sample has total assets (SIZE) of US$8.22 billion (US$0.90 billion) and mean (and median) growth rate (INVOPP) of 3%. The mean (median) bank also has a mean (median) Tobin's Q ratio (TQ) of 1.03 (1.02). The mean (median) market to book (MTB) ratio is 1.54 (1.40). The results show that markets seem to pay a premium over assets for our average sampled bank possibly due, in part, to the fact that this bank has lower information risk and/or lower cost of capital or it is seen by the market not to be overinvesting or expropriating the resources of its shareholders.

The loan loss provisions quality (ABACC) measure has mean (median) value of -0.00 (-0.00). PERSIST, which captures the persistence of earnings innovation, has a mean (median) value of 0.34 (0.29) and ranges between -0.65 and 1.41 with a standard deviation of 0.47. PREDICT, which measures the predictability of earnings has a mean (median) value of 0.67 (0.81) and ranges between -0.93 and 1 with a standard deviation of 0.36. The mean (median) value of SMOOTH, which captures the variability of income relative to the variability of cash flows, is 1.21 (1.07) and ranges between 0.03 and 56.47 with a standard deviation of 0.97.

Finally, the sample mean (median) value of aggregate measure of earnings quality (EQS), the sum of the bank-year rank of individual measures of earnings quality, is 22.42 (22.29) and ranges between 5.05 and 39.63 with a standard deviation of 6.02. EQS varies substantially higher (lower) than TQ (MTB): The coefficient of variation of EQS is 27% compared to that of TQ and MTB, which are 9% and 57%, respectively.

Panel B of Table 3.7 presents the Pearson correlation coefficients between the measures of bank valuation, individual and aggregate earnings quality measures, and other control variables. The table shows a positive and significant relation between earnings quality attributes and bank valuation, whether measured by TQ or MTB. In addition, the overall earnings quality measure correlates positively and significantly with measures of bank valuation. The correlations between EQS and each control variable range between 0.04

(LQD) and 0.29 (AGE) in absolute term. The correlation coefficients are also significant at the conventional levels. These low correlations suggest that earnings quality is a distinct bank characteristic not subsumed in the control variables included in our model. In addition, the correlations between each of the control variables are also low in absolute term, suggesting that multicollinearity is of minimum concern in our bank valuation models.

3.5.1 Empirical Results: Earnings Quality and Bank Valuation

Table 3.9 and Table 3.10 report the results of the investigation of the role of earnings quality on bank valuation. Panel A of each table presents the coefficient estimates of the bank valuation model (Model 3.5.1) estimated using the pooled sample of banks. Panel B presents the estimates of the yearly cross-sectional regressions (Fama and MacBeth, 1973). The tables differ only with respect to the dependent variable; the dependent variable in Table 3.9 is the Tobin's Q (TQ) ratio while the dependent variable in Table 3.10 is the market to book ratio (MTB). Models 1-4 of each table report the relation between bank valuation and earnings quality dimensions while Model 5 reports the result of the relation between bank valuation and aggregate earnings quality measure. Given the possibility that our individual earnings quality attribute may suffer from measurement error we put a greater weight on the results produced in Model 5 of each table.

The regression estimates in Table 3.9 and Table 3.10 provide two key results on the link between bank valuation and earnings quality. First, the aggregate earnings quality (EQS) enters positively and significantly as expected, consistent with the idea that earnings quality creates a premium for which the market is willing to pay. The finding is consistent with the theoretical prediction of Easley and O'Hara (2004) who argue that the precision of information reduces information risk and the cost of equity capital providing an explanation for an increase in market valuation of banks. However, results presented in the tables also suggest that the relation between bank valuation and the individual components of earnings quality is not consistently positive across the different dimensions. For example, while as expected the PERSIST and SMOOTH variables are positively and significantly related to bank valuation, the PREDICT and ABACC variables exhibit a significantly negative relation with bank valuation. Again, this result supports the idea that different dimensions of earnings quality may exhibit different relation with the variable of interest suggesting different consequences for different earnings attributes (see, Dechow et al., 2010). This result is consistent with analytical work of Lambert et al. (2007), who suggest that information risk may exert either a positive or negative

effect on the cost of equity. It is also consistent with the empirical study of Botosan and Plumlee (2002), who find that the cost of equity capital increases as the level of timely disclosure increases.

The control variables in Table 3.9 and Table 3.10 are generally significant and consistent with expectation. We find a strong and consistently significant positive relation between bank valuation and the explanatory variables - bank size, current and past bank performance, and liquidity ratio. However, while our proxy for investment opportunities is significantly related to bank valuation, as measured by market to book ratio, the variable is only significant in the model that includes ABACC as an explanatory variable and Tobin's Q as the dependent variable. While this result is surprising and unexpected, it is consistent with the cross-country study of the relation between bank valuation and corporate governance by Caprio et al. (2007). These authors find no significant relation between bank valuation and investment opportunities as measured by growth in loans. However, they establish a significant and positive relation between bank valuation and investment opportunities as proxied by return on equity and return on assets, both of which enter significantly positively in our regression models. Overall, the results in Table 3.9 and Table 3.10 show that each of the models explains a substantial portion (between 34% - 37%) of the variation in bank valuation. With the caveat that different earnings quality dimensions exhibit different relation with bank valuation, we conclude that aggregate earnings quality contributes to higher valuation of bank stocks by shareholders.

Table 3.9: Regression Results - Tobin's Q Ratio and Earnings Quality

Panel A: Pooled Regression

Model		(1)	(2)	(3)	(4)	(5)
PERSIST	+	0.002***				
		(4.98)				
PREDICT	+		-0.001***			
			(-3.28)			
SMOOTH	+			0.001***		
				(3.44)		
ABACC	+				-0.001***	
					(-2.95)	
EQS	+					0.001**
						(2.50)
LnSIZE	+	0.010***	0.011***	0.010***	0.011***	0.010***
		(12.95)	(14.42)	(13.48)	(17.12)	(12.30)
INVOPP	+	-0.010	-0.009	-0.008	0.004	-0.016
		(-0.79)	(-0.74)	(-0.64)	(0.33)	(-1.23)
LnAGE	+	0.003	0.004	0.003	0.005***	0.002
		(1.45)	(1.62)	(1.22)	(2.64)	(0.93)
ROA	+	0.745***	0.732***	0.734***	0.796***	3.321***
		(6.39)	(6.27)	(6.27)	(7.34)	(14.03)
ROAlg1	+	5.317***	5.349***	5.329***	4.296***	4.711***
		(21.38)	(21.47)	(21.21)	(21.35)	(18.28)
CAP_ASSET	+	-0.079***	-0.069***	-0.072***	-0.066***	-0.083***
		(-3.50)	(-3.05)	(-3.08)	(-4.84)	(-3.56)
LLPR	-	0.001	0.001	0.003	-0.001	0.044***
		(0.26)	(0.27)	(0.56)	(-0.15)	(7.71)
LQD	+	0.184***	0.188***	0.185***	0.197***	0.182***
		(6.33)	(6.44)	(6.21)	(7.92)	(5.99)
Intercept	+	0.942***	0.946***	0.942***	0.943***	0.944***
		(116.53)	(116.78)	(113.32)	(148.12)	(113.32)
Year Dummy		Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.34	0.34	0.34	0.34	0.36
N		5783	5783	5661	7180	5515

Table 3.9 continued next page

Table 3.9 continued
Panel B: Yearly Cross-Sectional Regressions

Model		(1)	(2)	(3)	(4)	(5)
PERSIST	+	0.001**				
		(2.29)				
PREDICT	+		-0.001*			
			(-2.09)			
SMOOTH	+			0.001***		
				(4.32)		
ABACC	+				0.001	
					(0.82)	
EQS	+					0.001*
						(2.05)
LnSIZE	+	0.007***	0.008***	0.007***	0.008***	0.007***
		(3.76)	(4.14)	(3.23)	(4.92)	(3.60)
INVOPP	+	-0.027	-0.026	-0.026	-0.009	-0.014
		(-1.49)	(-1.48)	(-1.39)	(-0.51)	(-0.88)
LnAGE	+	0.001	0.001	0.001	0.002	0.001
		(0.35)	(0.55)	(0.39)	(0.69)	(0.35)
ROA	+	6.629***	6.599***	6.619***	5.448***	7.475***
		(5.78)	(5.72)	(5.71)	(5.35)	(6.44)
ROAlg1	+	4.791***	4.831***	4.969***	4.013***	4.984***
		(6.72)	(6.78)	(6.65)	(6.25)	(6.96)
CAP_ASSET	+	-0.119	-0.095	-0.195	-0.060	-0.163
		(-1.59)	(-1.34)	(-1.58)	(-1.44)	(-1.51)
LLPR	-	0.095***	0.095***	0.094***	0.082***	0.105***
		(3.70)	(3.63)	(3.59)	(3.60)	(3.83)
LQD	+	0.170***	0.175***	0.171***	0.193***	0.171***
		(3.99)	(4.14)	(3.87)	(4.40)	(3.56)
Intercept	+	0.953***	0.954***	0.956***	0.947***	0.951***
		(49.18)	(49.94)	(48.10)	(56.00)	(50.30)
Average R^2		0.36	0.36	0.36	0.33	0.38
N		5783	5783	5661	7180	5515

The table presents the estimates of coefficients (above) and t-statistics (below) of the regression of bank valuation on earnings quality and other bank-specific control variables. TQ (Tobin's Q ratio) is calculated as the ratio of market value of equity (CRSP: absolute value of prc×shrout) plus total liabilities (Compustat Bank: total liabilities (tb)) plus deposit (Compustat Bank: dptc) to book value of assets (Compustat Bank: at). EQS is the aggregate earnings quality score and is the sum of the yearly rank of a bank's individual earnings quality measures. SMOOTH is the ratio of standard deviation of net income before extraordinary items (Compustat Bank: ibcomq) to the standard deviation of cash flows from operations (Compustat Bank: coeitq+dpq+pllq) - both variables are standardised by total assets (Compustat Bank: atq). PERSIST is the slope coefficient from the AR(1) model of earnings (Compustat Bank: ibcomq) on lagged earnings - both standardised by total assets. PREDICT is the standard deviation of the error terms from the AR(1) earnings persistent model (Equation 3.3.2). We estimate SMOOTH, PERSIST, and PREDICT using a 10-quarter rolling window. ABACC is the absolute value of the error term of the non-discretionary loan loss provisions model (Equation 3.3.1), estimated cross-sectionally. SMOOTH, PERSIST, PREDICT, and ABACC are measured such that greater value of each variable indicates higher earnings quality. LnSIZE is the log of total assets. INVOPP measures investment opportunities given by annual growth in bank revenue (the sum of interest and non-interest income). AGE is a measure of the bank age derived as natural logarithm of number of quarters a bank appears in the Compustat Bank database between 1961 to 2009. ROA is a measure of bank performance (profitability) and is given by the ratio of income before tax to total assets. ROAlg1 is the return on assets for the previous fiscal year. CAP_ASSET is the capital to assets ratio. LLPR is the ratio of loan loss provisions to interest income and LQD is the ratio of current assets to total assets. Current assets are defined as cash and due from banks. Data to compute all variables are from Compustat Bank database. All variables are computed at the end of each fiscal year. For the yearly cross-sectional regressions, the reported coefficient on each variable is the mean of the time series distribution of coefficients for that variable. The reported t-statistics is obtained as the mean of the time series distribution of coefficient divided by its standard deviation and multiplied by the square root of the number of cross sections. The model R-square (Average R^2) is the mean of the time series distribution of R-squares. The sample period is from 1990-2009. ***,**,* indicate statistically significant at 1%, 5% and 10%, respectively.

Table 3.10: Market to Book Ratio and Earnings Quality

Panel A: Pooled Sample						
Model		(1)	(2)	(3)	(4)	(5)
PERSIST	+	0.017***				
		(4.39)				
PREDICT	+		-0.007*			
			(-1.80)			
SMOOTH	+			0.014***		
				(3.77)		
ABACC	+				-0.002	
					(-0.70)	
EQS	+					0.018***
						(4.31)
LnSIZE	+	0.110***	0.119***	0.114***	0.124***	0.105***
		(11.48)	(12.68)	(11.96)	(15.84)	(10.59)
INVOPP	+	-0.295*	-0.282*	-0.306*	-0.080	-0.347**
		(-1.86)	(-1.78)	(-1.88)	(-0.59)	(-2.10)
LnAGE	+	0.048*	0.050*	0.040	0.067***	0.038
		(1.74)	(1.83)	(1.43)	(3.23)	(1.32)
ROA	+	5.001***	4.872***	4.952***	5.683***	22.493***
		(3.45)	(3.36)	(3.40)	(4.28)	(7.57)
ROAlg1	+	52.681***	52.911***	52.784***	42.931***	47.889***
		(17.04)	(17.08)	(16.89)	(17.41)	(14.79)
CAP_ASSET	+	-1.854***	-1.760***	-1.698***	-1.168***	-1.836***
		(-6.62)	(-6.27)	(-5.86)	(-6.97)	(-6.28)
LLPR	-	0.149***	0.153***	0.164***	0.156***	0.461***
		(2.69)	(2.76)	(2.95)	(2.96)	(6.48)
LQD	+	2.052***	2.086***	2.098***	2.004***	2.101***
		(5.67)	(5.76)	(5.64)	(6.59)	(5.52)
Intercept	+	0.372***	0.409***	0.368***	0.283***	0.389***
		(3.70)	(4.07)	(3.56)	(3.63)	(3.72)
Year Dummy		Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.34	0.34	0.34	0.34	0.36
N		5783	5783	5661	7180	5515

Table 3.10 continued next page

Table 3.10 continued
Panel B: Yearly Cross-Sectional Regressions

Model		(1)	(2)	(3)	(4)	(5)
PERSIST	+	0.011**				
		(2.49)				
PREDICT	+		-0.008			
			(-1.65)			
SMOOTH	+			0.009***		
				(4.18)		
ABACC	+				0.009	
					(1.39)	
EQS	+					0.011**
						(2.86)
LnSIZE	+	0.081***	0.090***	0.079**	0.098***	0.081***
		(3.33)	(3.61)	(2.90)	(4.05)	(3.08)
INVOPP	+	-0.416*	-0.414*	-0.418*	-0.112	-0.271
		(-1.92)	(-1.93)	(-1.90)	(-0.64)	(-1.62)
LnAGE	+	0.019	0.024	0.018	0.037	0.019
		(0.69)	(0.86)	(0.63)	(1.57)	(0.71)
ROA	+	56.833***	56.559***	56.599***	47.190***	64.701***
		(5.35)	(5.29)	(5.28)	(5.23)	(5.91)
ROAlg1	+	48.016***	48.389***	50.394***	40.585***	50.150***
		(6.42)	(6.50)	(6.37)	(5.65)	(6.73)
CAP_ASSET	+	-2.608***	-2.352**	-3.516**	-1.666**	-3.229**
		(-2.99)	(-2.90)	(-2.34)	(-2.72)	(-2.46)
LLPR	-	0.826**	0.827**	0.816**	0.855**	0.930**
		(2.29)	(2.26)	(2.24)	(2.49)	(2.46)
LQD	+	1.998***	2.058***	2.021***	2.075***	2.038***
		(4.02)	(4.13)	(3.92)	(4.07)	(3.54)
Intercept	+	0.521**	0.524**	0.557**	0.360	0.494*
		(2.14)	(2.19)	(2.22)	(1.62)	(2.06)
Adjusted R^2		0.36	0.36	0.36	0.34	0.38
N		5783	5783	5661	7180	5515

The table presents the estimates of coefficients (above) and t-statistics (below) of the regression of bank valuation (MTB) on earnings quality and other bank-level control variables. MTB is calculated as the ratio of market value of equity to book value of equity. Market value of equity is the product of market price per share and number of shares outstanding. EQS is the aggregate earnings quality score and is the sum of the yearly rank of a bank's individual earnings quality measures. SMOOTH is the ratio of standard deviation of net income before extraordinary items (Compustat Bank: ibcomq) to the standard deviation of cash flows from operations (Compustat Bank: coeitq+dpq+pllq) - both variables are standardised by total assets (Compustat Bank: atq). PERSIST is the slope coefficient from the AR(1) model of earnings (Compustat Bank: ibcomq) on lagged earnings- both standardised by total assets. PREDICT is the standard deviation of the error terms from the AR(1) earnings persistent model (Equation 3.3.2). We estimate SMOOTH, PERSIST, and PREDICT using a 10-quarter rolling window. ABACC is the absolute value of the error term of the non-discretionary loan loss provisions model (Equation 3.3.1), estimated cross-sectionally. SMOOTH, PERSIST, PREDICT, and ABACC are measured such that greater value of each variable indicates higher earnings quality. LnSIZE is the log of total assets. INVOPP measures investment opportunities given by annual growth in bank revenue (the sum of interest and non-interest income). AGE is a measure of the bank age derived as natural logarithm of number of quarters a bank appears in the Compustat Bank database between 1961 to 2009. ROA is a measure of bank performance (profitability) and is given by the ratio of income before tax to total assets. ROAlg1 is the return on assets for the previous fiscal year. CAP_ASSET is the capital to assets ratio. LLPR is the ratio of loan loss provisions to interest income and LQD is the ratio of current assets to total assets. Current assets are defined as cash and due from banks. Data to compute all variables are from Compustat Bank database. All variables are computed at the end of each fiscal year. For the yearly cross-sectional regressions, the reported coefficient on each variable is the mean of the time series distribution of coefficients for that variable. The reported t-statistics is obtained as the mean of the time series distribution of coefficient divided by its standard deviation and multiplied by the square root of the number of cross sections. The model R-square is the mean of the time series distribution of R-squares. The sample period is from 1990-2009. ****,**,** indicate statistically significant at 1%, 5% and 10%, respectively.

3.5.2 Endogeneity

The results of the multiple regression analysis presented so far relies on the assumption that bank valuation and earnings quality are exogenous variables. This assumption relies on the possibility that investors are attracted to banks with high earnings quality with the consequence that the valuations of those banks are enhanced. If this assumption holds then our implicit assumption that causality runs from bank earnings quality to bank valuation holds. However, it is possible that this relation is endogenous leading to spurious relation between bank valuation and earnings quality. For example, it is possible that large investors are attracted to banks with high valuation and these investors are able to extract high quality earnings from banks. In such a situation, bank valuation and earnings quality are simultaneously determined and our results suffer from an endogeneity bias.

To address the endogeneity bias, we estimate bank valuation and earnings quality models using a two-stage least squares (2SLS) method. The method requires that we identify exogenous variables that are correlated with only earnings quality but not (at least directly) with bank valuation. However, the identification of valid exogenous variables that explain bank earnings quality and which do not affect bank valuation is an onerous task. Notwithstanding this difficulty, we provide what we consider an innovative way to address the endogeneity concern regarding the relation between bank valuation and earnings quality by using three variables as instruments for earnings quality.

First, we argue for a relationship between bank earnings quality and (potential) tax liability. We argue that banks intending to minimise their tax liability may be motivated to manage their earnings downwards, thus affecting the quality of these earnings. The idea that tax impacts earnings quality finds support in empirical studies (e.g. Phillips et al., 2003; Dhaliwal et al., 2004). If tax plays a role in earnings quality, we argue that banks with high tax liability in the previous year are more likely to manage earnings downwards to minimise current period tax liability. We use LAGTAX calculated as the previous year tax liability standardised by total assets, as one instrument for earnings quality. We expect a negative relation between LAGTAX and earnings quality. While we argue for a link between LAGTAX and earnings quality we have no logical argument to expect a direct link between bank valuation and LAGTAX.

Altamuro and Beatty (2010) provide evidence that internal control regulations affect financial reporting of banks. Specifically, these authors report that the FDICIA-mandated internal control requirements increased loan loss provisions validity, earnings persistence and cash flow predictability, and reduced benchmark-beating and accounting conservatism

for affected versus unaffected banks.[26] They exploit the specific provision of the FDICIA which subjects institutions with assets equal to or more than US$500 million to internal control monitoring and reporting requirements. Management of other banks do not have to issue a report on the effectiveness of internal controls over financial reporting or have these reports attested by their public auditors. We use a dummy variable FDICIA that takes the value of 1 for banks with assets equal to or greater than US$500 million and 0 otherwise. While this variable correlates with bank valuation and our bank size variables, we argue that this variable is predetermined and exogenous to our analysis, as the reporting status of banks under this provision is externally determined, even though it is a function of a bank characteristic. In addition, there is no reason to believe that markets value such reporting status. We expect a positive relation between FDICIA and earnings quality. Even though the FDICIA Act came into effect in 1991, the amendment requiring specific banks to provide management report on internal control came into effect in 1993. Therefore, the sample that we use for the 2SLS starts from 1993.

Finally, in 2002, the US government, in the wake of major corporate and accounting scandals, introduced the Sarbanes-Oxley Act that proponents claim should improve internal control and financial reporting of public companies. The most important provisions of this Act are the SOX 302 and SOX 404.[27] Ashbaugh-Skaife et al. (2008) report that relative to non-reporting firms, firms reporting internal control deficiencies under the SOX 404 have lower quality accruals, as measured by accrual noise and absolute accruals. Most importantly, they find that the quality of internal control affects the quality of accruals: firms whose auditors confirm the remediation of previously reported internal control deficiencies experience significant improvement in accruals quality while firms that receive different internal control audit opinions in successive years also experience changes in accruals quality consistent with changes in internal control quality. We use a dummy variable (SOX) that equals 1 for post-SOX years (from 2003) and 0, otherwise. We expect a positive relation between this variable and earnings quality.

Table 3.11 presents the results of the first stage and second stage least square regressions. Model 1 of the table regresses the composite earnings quality measure on the

[26] FDICIA is the Financial Deposit Insurance Corporation Improvement Act of 1991.

[27] The provision of SOX 302 came into effect in August 2002 and requires management to evaluate internal controls over financial reporting and certify the effectiveness of the controls. SOX 404, which became effective from November 15 2004, requires companies that file annual report with SEC to report on management's responsibilities to establish and maintain adequate control over the company's financial reporting process, as well as management's assessment of the effectiveness of these controls. The provision of SOX 404 also requires the company's external auditor to report on management's assessment, as well as on the effectiveness of the company's control.

proposed instrumental variables as well as other control variables in the bank valuation model. As shown in the table our instrumental variables and three other innate variables (SIZE, LLPR and ROAlg1) are significant in explaining bank earnings quality, even though the tax variable is not correctly signed. F-test that these instruments and the significant innate variables can be excluded from the first-stage regressions was strongly rejected. Thus, we conclude that our instruments are valid instruments for earnings quality. In the second stage we regress bank valuation (Tobin's Q and market to book ratio) on log of bank age, current period profitability and liquidity while instrumenting for earnings quality using SOX, FDICIA, LAGTAX, SIZE, and ROAlg1.[28] The results shown under Model 2 and Model 3 of Table 3.11 support our primary finding of a positive and significant relation between bank valuation and earnings quality, even after controlling for the potential endogeneity bias.

[28]We exclude the investment opportunities and capital adequacy variables from the regression because neither is significant in the 2SLS. However, our results remain the same if we include these variables.

Table 3.11: Instrumental Variable Regressions

	(1)	(2)	(3)
LnSIZE	0.545***		
	(12.14)		
INVOPP	0.199		
	(0.34)		
CAP_ASSET	0.865		
	(0.81)		
LLPR	-2.132***		
	(-8.74)		
SOX	0.259***		
	(3.29)		
FDICIA	0.511***		
	(4.15)		
LAGTAX	0.001***		
	(3.00)		
ROAlg1	72.953***		
	(6.35)		
LnAGE	0.079	0.173***	0.003
	(0.79)	(2.92)	(0.75)
ROA	1.383	31.515***	2.922***
	(0.14)	(11.90)	(13.14)
LQD	-1.36	0.842*	0.088**
	(-1.00)	(1.70)	(2.12)
EQS		0.175***	0.015***
		(7.14)	(7.22)
Intercept	0.674	-0.066	0.941***
	(1.51)	(-0.30)	(55.80)
Adjusted R^2	0.11	0.08	0.06
N	4882	4882	4882

The table presents the estimates of coefficients (above) and t-statistics (below) of two stage least square regressions (2SLS). The dependent variables are EQS, TQ, and MTB for Models 1, 2 and 3, respectively. TQ (Tobin's Q ratio) is calculated as the ratio of market value of equity (CRSP:absolute value prc×shrout) plus total liabilities (Compustat Bank: total liabilities (tb)) plus deposit (Compustat Bank: dptc) to book value of assets (Compustat Bank: at). MTB is the ratio of market value of equity to book value of equity. FDICIA is a dummy variable that takes the value of 1 (otherwise 0) for banks subjects to the internal control provisions of the Federal Deposit Insurance Improvement Act of 1991 - banks for which assets value (Compustat: at) is equal to or greater than US$500 million. SOX is a dummy variable that takes the value of 1 for post-Sarbanes-Oxley Act years (starting 2003) and 0 otherwise. LAGTAX is the lag value of bank income tax (Compustat: txt). EQS is the aggregate earnings quality score and is the sum of the yearly rank of a bank's individual earnings quality measure. LnSIZE is the log of total assets. INVOPP is investment opportunity given by annual growth in bank revenue (the combination of interest and non-interest income). LnAGE is a measure of the bank age and is given by the log of number of quarters a bank appears in the Compustat Bank database between 1961 to 2009. ROA is a measure of bank performance (profitability) and is given by the ratio of income before tax to total assets. is the return on assets for the previous fiscal year. CAP_ASSET is the capital to assets ratio. LLPR is the ratio of loan loss provisions to interest income and LQD is the ratio of current asset to total assets. Current assets are defined as cash and due from banks. The sample period is from 1990-2009. ***,*,*** indicate statistically significant at 1%, 5% and 10%, respectively.

3.6 Bank Earnings Quality and Value Relevance

Lev (1989) states that one explanation for low R-squares in earnings or returns model is that 'no serious attempt is being made to question the quality of the reported earnings number prior to correlation with returns.' Botosan (2000) suggests that the ultimate benefit of providing more information to the capital markets is a lower cost of equity capital and thus a higher stock price, for a given level of earnings. Thus, both Lev (1989) and Botosan (2000) imply that the relation between earnings and price is conditional on earnings quality. In this section, we take another approach to establishing a link between bank valuation (and the cost of equity) and earnings quality by investigating whether higher quality earnings are more value relevant than lower quality earnings. Specifically, we investigate whether the price-earnings relation depends on the quality of reported earnings. Following extant literature (e.g. Barth et al., 1999; Bao and Bao, 2004), we define earnings multiples as either the coefficient on earnings in price-earnings regression or the coefficient on earnings change in price-change-earning-change regression.

For each year in the study, we classify banks into two groups depending on their individual and aggregate earnings quality scores. Specifically, for each earnings quality measure, including the aggregate earnings quality, we classify a bank as a high earnings quality bank (HEQB) if its value on an earnings quality measure in that year is greater than the median value of the earnings quality measure for all banks in that year. We classify a bank as a low earnings quality bank (LEQB) if its value on an earnings quality measure in that year is lower than or equal to the median value of the earnings quality measure for all banks in that year. Using this classification, we then test whether banks with better earnings quality generate a higher firm value. In line with the theoretical basis already established in this chapter, we argue that higher earnings quality should translate into higher bank value as banks with higher earnings quality exhibit lower information risk and lower cost of capital.

Extant research (e.g. Easton and Harris, 1991; Kothari and Sloan, 1992) report a positive and significant relation between stock price and earnings using both the price-level regression and change regression (return regression). The following equation captures the price-level value relevance model:

$$PRC_{i,t} = \alpha_0 + \beta_1 NI_{i,t} + \varepsilon_{i,t} \tag{3.6.1}$$

where PRC is the price per share and NI is the net income per share.

The change regression can be represented by the following regression equation:

$$CHGPRC_{i,t} = \alpha_0 + \beta_1 CHGNI_{i,t} + \varepsilon_{i,t} \tag{3.6.2}$$

where CHGPRC is the annual change in price, CHGNI is the annual change in net income per share. The intercept and the error term in both Equation 3.6.1 and Equation 3.6.2 capture information relevant factors omitted in the regression models.

Barth et al. (1999) show that an indicator variable can be included in the level and change regressions to compare the price-earnings and price-change-earnings-change multiples between two sample groups. In addition, evidence suggests that the price-earnings ratio is a positive function of growth and a negative function of risk (Collins and Kothari, 1989; Easton and Zmijewski, 1989). Finally, Barth et al. (1999) note that cross-sectional differences in growth and risk may result in cross-sectional differences in earnings multiples. Thus, in line with their study, we allow the coefficient on net income to vary with measures of growth, risk, and bank size. Therefore, to examine whether earnings multiples is dependent on bank information quality (H3a), and in particular whether banks with higher earnings quality have higher earnings multiples than banks with lower earnings quality (H3b), we estimate the following regression:

$$\begin{aligned} PRC_{i,t} \quad = \quad & \alpha_0 + \beta_1 NI_{i,t} + \beta_2 (EQ_{i,t} \times NI_{i,t}) + \beta_3 (EQTA_{i,t} \times NI_{i,t}) \\ & + \beta_4 (TA_{i,t} \times NI_{i,t}) + \beta_5 (GROWTH_{i,t} \times NI_{i,t}) \\ & + \beta_6 (EVAR_{i,t} \times NI_{i,t}) + Year\ Controls + \varepsilon_{i,t} \end{aligned} \tag{3.6.3}$$

where i and t are the bank and time subscripts, respectively. EQ is an indicator variable that takes the value of 1 (0) for bank HEQBs (LEQBs).[29] We include control variables for risk (EQTA×NI) and (EVAR× NI), bank size (TA×NI), and growth (GROWTH×NI) to account for bank-specific characteristics that may affect the price-earnings relation. We measure GROWTH as the 3-year compound growth rate of book value of equity (e.g. Beaver et al., 1989; Barth et al., 1999). EQTA, a measure of risk, is the ratio of equity capital to total assets. EVAR, controls for operating risk, and is the variance of the annual percentage change in earnings in the past four years (see, also, Barth et al.,

[29] HEQBs and LEQBs are defined with respect to aggregate earnings quality, earnings persistence, earnings smoothing, predictability, and accruals quality. We use the following variables dPERSIST, dPREDICT, dSMOOTH, dABACC and dEQS in our regressions. Thus, for example, in line with our definition of HEQBs, EQ for the persistence variable (dPERSIST) takes the value of 1 (otherwise 0) if the bank's persistence measure in that year is greater than the median value of the persistence measure for all banks in that year.

1999). In line with extant literature we expect negative coefficient on the risk interaction variables as more risky and levered banks should have higher cost of capital and lower price. TA is the book value of total assets. We also include dummy variable for years to control for the year-to-year variation in the price-earnings relation. The coefficient of interest is β_2. A significantly positive coefficient on earnings quality interacted with earnings is consistent with the hypothesis that price-earnings relation depends on bank information quality, as measured by earnings quality, and positively stronger for higher quality earnings.

We also consider a change regression similar to those by Barth et al. (1999) and Bao and Bao (2004).[30] We test the following change regression:

$$\begin{aligned} CHGPRC_{i,t} &= \alpha_0 + \beta_1 CHGNI_{i,t} + \beta_2(EQ_{i,t} \times CHGNI_{i,t}) + \beta_3(EQTA_{i,t} \times CHGNI_{i,t}) \\ &\quad + \beta_4(TA_{i,t} \times CHGNI_{i,t}) + \beta_5(GROWTH_{i,t} \times CHGNI_{i,t}) + \\ &\quad \beta_6(EVAR_{i,t} \times CHGNI_{i,t}) + Year\ Controls + \varepsilon_{i,t} \end{aligned} \tag{3.6.4}$$

where CHGPRC is the change in price per share normalised by beginning price per share and CHGNI is the change in earnings normalised by lagged earnings. All other variables are as defined in Equation 3.6.3 above.

Table 3.12 presents the descriptive statistics for the full sample of banks as well as the subsamples - high earnings banks (EQS=1) and low earnings quality banks (EQS=0). Specifically, high earnings banks (HEQBs) are significantly larger and more risky than high earnings banks (LEQBs). The table also shows that bank earnings quality seems to reflect in share price. Even though the results show no significant difference between the reported earnings for HEQBs and LEQBs, the price per share of HEQBs is significantly larger than price per share LEQBs. This result suggests that for a given level of earnings investors seem to reward banks with higher quality with greater price than banks with lower earnings quality. This result is consistent with the negative relationship between bank earnings quality and the cost of equity earlier reported in this study. Panel B of Table 3.12 also presents the Pearson correlation matrix. The result supports a positive and significant correlation between bank earnings (NI) and bank stock price (PRC). The

[30] While Barth et al. (1999) include banks in their sample and specifically allow for the coefficient of earnings variable to vary for banks (and utility firms), their study looks at the market pricing of pattern of increasing earnings, and not earnings quality. On the other hand, while (Bao and Bao, 2004) looks at market pricing of smoothing, a component of our aggregate earnings quality, their sample excludes banking firms. Moreover, our operationalisation of smoothing is different from theirs.

correlation between change in bank earnings (CHGNI) and change in bank stock price (CHGPRC), even though economically low, is significantly positive. These results are consistent with the positive pricing (value relevance) of earnings.

Columns for Models 1-5 in Panel A of Table 3.13 present the estimates of Equation 3.6.3 using the pooled sample of banks. Panel B shows the estimates of the yearly cross-sectional regressions. As expected, the results show a significantly positive relation between earnings and bank stock price. Most importantly, except for the predictability variable, the regression coefficients for the indicator variable terms, which condition the relation between price and earnings on bank earnings quality are significantly positive. The results presented in Panel A show that the price-earnings multiple of banks with higher earnings quality is significantly larger than price-earnings multiple of banks with low earnings quality, after controlling for risk, bank size and growth. These results are consistent with those presented in Panel B for yearly cross-sectional regressions. The coefficients on EQTA, TA, GROWTH, EVAR, interacted with earnings, are generally significant and consistent with expectations. These results give support to H3a: that the price-earnings relation is dependent on bank information quality (earnings quality) and H3b - that banks with better earnings quality have stronger positive price-earnings relation. Thus, markets seem to place more values on earnings of banks that are of higher quality compared to earnings of banks with the same size, risk, and growth.

Columns for Models 1-5 in Panel A of Table 3.14 present the estimates of Equation 3.6.4 using the pooled sample of banks. Panel B shows the estimates of the yearly cross-sectional regressions. Unlike the price-level regressions, estimation of the change regressions using the pooled sample and the yearly cross-sectional regressions provide weak support for the differential price-change-earnings-change relation between banks with high earnings quality and banks with low earnings quality. As reported in the table, as expected, there appears to be a difference in price-change-earnings-change relation between banks with high earnings quality and banks with low earnings quality. However, only the coefficient on dABACC interacted with earnings change is consistently positive and statistically significant whether we use the pooled sample or the yearly cross-sectional regressions. While the dummy variable for the composite earnings quality interacted with earnings change variable is positive it is only statistically significant under the yearly cross-sectional regressions. This positive loading on the dummy EQS variable suggests that banks with better earnings quality enjoy greater positive price change for a unit change in earnings. In view of the weak evidence presented in this table, we are cautious in linking earnings quality to price-change-earnings-change relation.

Table 3.12: Descriptive Statistics and Correlation Matrix

Panel A: Descriptive Statistics

	Full Sample							HEQB vs. LEQB Sample					
								HEQB		LEQB		HEQB vs. LEQB	
	Mean	SD	Min	Max	Q1	Q2	Q3	Mean	Median	Mean	Median	t-statistic	z-statistic
PRC	25.98	22.13	0.37	518.94	14.33	22.35	32.14	30.48	25.74	21.38	19.16	12.60	14.71
NI	0.28	0.95	-17.91	8.48	0.19	0.37	0.55	0.36	0.44	0.20	0.30	4.87	14.65
EQTA	0.17	0.10	0.00	0.77	0.10	0.16	0.23	0.18	0.17	0.16	0.14	7.79	7.92
TA	20.49	108.03	0.04	2223.30	0.75	1.94	6.91	35.91	3.00	4.74	1.36	8.75	15.65
GROWTH	0.16	0.17	-0.45	1.73	0.06	0.13	0.23	0.17	0.13	0.15	0.12	2.41	3.19
EVAR	5.96	26.24	0.00	220.43	0.03	0.15	1.09	4.02	0.12	7.94	0.21	-4.49	-7.87
CHGPRC	-0.01	0.36	-0.96	7.51	-0.21	-0.01	0.18	0.02	0.02	-0.04	-0.03	4.77	5.18
CHGNI	-0.85	12.48	-493.00	125.00	-0.37	-0.02	0.16	-0.94	0.02	-0.76	-0.11	0.44	7.67

Panel B: Correlation Matrix

	PRC	NI	EQTA	TA	GROWTH	EVAR	CHGPRC
PRC	1						
NI	0.49***	1					
EQTA	0.02	0.01	1				
TA	0.15***	0.05***	0.14***	1			
GROWTH	0.12***	0.12***	0.04**	0.12***	1		
EVAR	-0.05***	-0.08***	0.01	0.04**	-0.03**	1	
CHGPRC	0.26***	0.21***	-0.02*	-0.02	0.04***	0.00	1
CHGNI	0.06***	0.37***	0.01	-0.01	0.03*	-0.16***	0.10***

The table presents descriptive statistics for regression variables including differences in means and medians of high quality earnings and low quality earnings banks for a full sample of Compsutat banks for the period 1990-2009. PRC is the stock price (CRSP - prc). NI is the net income per share before extraordinary items (Compustat Bank- epspx). CHGNI is the change in net income normalised by beginning price per share. CHGPRC is the one-year change in price per share normalised by beginning price per share. EQTA is the ratio of equity (COMPUTAT Bank- seq) to total assets (COMPUTAT Bank- at). GROWTH is the four-year annual growth rate of book value of equity (Compustat Bank- seq). EVAR is the variance of the past five years' percentage change in earnings. HEQBs (LEQBs) refers to high (low) earnings quality banks with aggregate earnings quality higher than (equal to or less than) annual median. The test statistics are the t-test (t-statistics) of difference in means and Wilcoxon test of difference in medians (z-statistics), respectively. ***, **, * indicate statistically significant at 1%, 5%, and 10%, respectively.

Table 3.13: Earnings Quality and Value Relevance of Earnings - Price-Level Regressions

		Panel A: Pooled Sample					Panel B: Yearly Cross-Sectional Regressions				
		(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
NI	+	7.463**	11.896***	9.541***	9.390***	8.806***	24.067***	27.992***	23.792***	22.724***	21.374***
		(2.41)	(4.41)	(3.93)	(3.76)	(3.51)	(5.88)	(4.81)	(5.87)	(5.60)	(5.55)
EQTA×NI	-	-19.215*	-21.026*	-21.876**	-30.604**	-20.286*	-18.698**	-11.986	-17.453	-15.474	-19.834
		(-1.71)	(-1.73)	(-2.00)	(-2.48)	(-1.83)	(-2.25)	(-0.91)	(-1.71)	(-1.26)	(-1.78)
TA×NI	+	0.019**	0.024***	0.022**	0.015*	0.021**	0.008	0.009*	0.010	0.007	0.005
		(2.45)	(2.71)	(2.36)	(1.71)	(2.23)	(1.65)	(2.06)	(1.77)	(1.11)	(0.64)
GROWTH×NI	+	19.147**	20.247**	15.506*	14.995*	18.061*	16.390***	15.542***	17.691***	21.524***	20.516***
		(2.28)	(1.98)	(1.75)	(1.92)	(1.88)	(3.69)	(3.74)	(4.96)	(4.83)	(4.96)
EVAR×NI	-	-0.009**	-0.009***	-0.008**	-0.008***	-0.010***	-0.014	-0.018	-0.011	-0.017	-0.008
		(-2.51)	(-2.70)	(-2.31)	(-3.39)	(-2.60)	(-1.00)	(-1.23)	(-0.67)	(-1.16)	(-0.59)
dPERSIST×NI	+	6.441**					7.766***				
		(2.08)					(3.37)				
dPREDICT×NI	+		-0.804					1.707			
			(-0.20)					(0.49)			
dSMOOTH×NI	+			4.938*					7.198***		
				(1.71)					(3.60)		
dABACC×NI	+				10.783***					7.843***	
					(2.76)					(4.56)	
dEQS×NI	+					4.250*					10.648***
						(1.81)					(4.27)
intercept	+	22.399***	22.278***	22.253***	21.467***	22.359***	14.640***	14.234***	14.613***	14.859***	14.752***
		(27.87)	(23.49)	(22.73)	(23.20)	(24.21)	(27.27)	(34.66)	(26.03)	(29.20)	(26.00)
Year Dummy		Yes	Yes	Yes	Yes	Yes	NA	NA	NA	NA	NA
R^2		0.39	0.37	0.38	0.42	0.38	0.56	0.57	0.55	0.56	0.57
N		3605	3605	3605	3605	3605	3605	3605	3605	3605	3605

The table presents the estimates of coefficients (above) and t-statistics (below) of price-level regressions. NI is the net income per share before extraordinary items (Compustat Bank- epspx) normalised by beginning price per share (CRSP- absolute value of prc). EQTA is the the ratio of equity (Compustat Bank- seq) to total assets (Compustat Bank- at). GROWTH is the four-year annual growth rate of book value of equity (Compustat Bank- seq). EVAR is the variance of the past five years' percentage change in earnings (Compustat Bank- epspx). dEQS is a dummy variable earnings quality, which equals 1 for bank-year with aggregate earnings quality greater than the median aggregate earnings quality for the year, and 0 otherwise. TA is the total assets. dPERSIST, dPREDICT, dABACC, and dSMOOTH are computed in similar manner as dEQS. For the yearly cross-sectional regressions, the reported coefficient on each variable is the mean of the time series distribution of coefficients for that variable. The reported t-statistic for the time series distribution of a coefficient is the mean coefficient divided by its standard deviation and multiplied by the square root of the number of cross sections. The reported R-square for the pooled regressions is the adjusted R-square while the model R-square for the yearly regressions is the mean of the time series distribution of R-squares. ***, **, * indicate significant at the 1%, 5%, and 10% levels, respectively.

Table 3.14: Earnings Quality and Value Relevance of Earnings - Change Regressions

	Panel A: Pooled Sample					Panel B: Yearly Cross-Sectional Regressions				
	1	2	3	4	5	1	2	3	4	5
chgNI	0.005***	0.003**	0.004**	0.004***	0.002	0.099*	0.068	0.073*	0.071*	0.065*
	(3.03)	(2.32)	(2.02)	(2.89)	(1.29)	(2.09)	(1.54)	(1.86)	(1.81)	(1.83)
EQTA×chgNI	0.005	0.001	0.004	-0.006	0.007	0.015	0.094	0.009	-0.012	-0.025
	(0.59)	(0.15)	(0.51)	(-0.67)	(0.83)	(0.23)	(1.28)	(0.13)	(-0.16)	(-0.44)
TA×chgNI	0.000*	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.001	-0.000
	(1.84)	(0.96)	(1.22)	(-0.26)	(1.22)	(1.33)	(-0.07)	(0.24)	(0.41)	(-0.62)
GROWTH×chgNI	-0.012***	-0.012***	-0.011***	-0.008***	-0.009***	-0.029	-0.024	-0.032	-0.018	-0.036
	(-4.08)	(-4.09)	(-3.79)	(-3.05)	(-3.45)	(-0.26)	(-0.27)	(-0.34)	(-0.18)	(-0.39)
EVAR×chgNI	-0.000**	-0.000	-0.000	-0.000*	-0.000	-0.000*	-0.000*	-0.000	-0.000	-0.000*
	(-2.08)	(-1.60)	(-1.01)	(-1.88)	(-1.53)	(-2.11)	(-2.09)	(-0.35)	(-0.62)	(-1.92)
dPERSIST×chgNI	-0.002**					-0.031				
	(-2.16)					(-1.51)				
dPREDICT×chgNI		0.002**					0.003			
		(2.16)					(0.19)			
dSMOOTH×chgNI			0.002					0.025		
			(1.60)					(0.87)		
dABACC×chgNI				0.006***					0.046**	
				(3.44)					(2.64)	
dEQS×chgNI					0.001					0.063***
					(1.50)					(3.51)
intercept	-0.004	-0.005	-0.004	-0.005	-0.005	0.005	0.005	0.005	0.003	0.004
	(-0.84)	(-0.90)	(-0.86)	(-0.90)	(-0.91)	(0.09)	(0.08)	(0.09)	(0.05)	(0.06)
R^2	0.31	0.31	0.30	0.31	0.30	0.08	0.09	0.09	0.09	0.10
N	3601	3601	3601	3601	3601	3601	3601	3601	3601	3601

The table presents the estimates of coefficients (above) and t-statistics (below) of price-level regressions. CHGNI is the change in net income (Compustat Bank- epspx) normalised by beginning price per share (CRSP- absolute value of prc). EQTA is the the ratio of equity to total assets. CHGPRC is the one-year change in price per share normalised by beginning price per share. EQTA is the the ratio of equity (Compustat Bank- seq) to total assets (Compustat Bank- at). GROWTH is the four-year annual growth rate of book value of equity (Compustat Bank- seq). EVAR is the variance of the past five years' percentage change in earnings (Compustat Bank- epspx). dEQS is a dummy variable earnings quality, which equals 1 for bank-year with aggregate earnings quality greater than the median aggregate earnings quality for the year, and 0 otherwise. TA is the total assets. dPERSIST, dPREDICT, dABACC, and dSMOOTH are computed in similar manner as dEQS. For the yearly cross-sectional regressions, the reported coefficient on each variable is the mean of the time series distribution of coefficients for that variable. The reported t-statistics for the time series distribution of a coefficient is obtained as the mean coefficient divided by its standard deviation and multiplied by the square root of the number of cross sections. The reported R-square for the pooled regressions is the adjusted R-square while the model R-square for the yearly regressions is the mean of the time series distribution of R-squares. ***, **, * indicate significant at the 1%, 5%, and 10% levels, respectively.

3.7 Conclusion

A number of analytical studies suggest a negative relation between the quality and quantity of information available to investors and the cost of equity. This chapter presents the results of the investigation of the implication of bank earnings quality for bank cost of equity. We first construct five accounting based measures of implied cost of equity. Tests of validity suggest that these measures are adequate measures of bank cost of equity. Our results suggest that each of our cost of equity measures is increasing in beta, the primary risk proxy, thus allowing us to combine these measures into an average cost of equity measure to reduce the impact of potential measurement error. In addition, we also construct a composite earnings quality measure that includes four accounting based measures of earnings quality: persistence, smoothing, predictability and the quality of loan loss provisions.

Our results show a statistically negative relation between earnings quality, as captured by our composite earnings quality proxy and bank cost of equity. However, we also find that the relation between earnings quality and the cost of equity is not unidirectional neither is it generally statistically significant across all dimensions of earnings that form our composite earnings quality measure. While we report a negative and significant relation between the cost of equity and predictability and the quality of loan loss provisions, the relation between the cost of equity and smoothing is insignificantly negative at all conventional levels. Contrary to expectation, this study also reports a positive and significant relation between persistence of earnings and bank cost of equity.

We draw further conclusion on the relationship between earnings quality and cost of equity by drawing indirect evidence from the role of earnings quality in market valuation of banks and the value relevance of bank earnings. Again, consistent with expectation, we find significant positive relation between our composite measure of earnings quality and bank valuation. This positive relationship continues to exist even after controlling for the endogeneity of earnings quality using three "innovative" instrumental variables for bank earnings quality. However, our results also show that the relation between individual earnings quality attributes and bank valuation is not unidirectional as we find a significantly positive relation between earnings persistence (and earnings smoothing) and bank valuation while earnings predictability (quality of loan loss provisions) is significantly (insignificantly) negatively related to bank valuation.

Finally, our study also shows that stocks of banks with higher earnings quality enjoy higher price-earnings multiples compared to similar banks with lower earnings quality. Overall, the results presented in this study suggest that markets seem to assess and

incorporate different dimensions of bank earnings quality in placing a price on bank stock.

In view of the importance of earnings as a primary metric in the CAMEL criteria for assessing bank soundness and its role in investment decisions, our findings have practical implications for bank regulators, management, and the investing public as we present evidence that banks with better earnings quality enjoy lower cost of equity, higher bank valuation, and higher price-earnings multiple. To this end, the argument by regulatory authorities suggesting a negative relation between regulatory requirements (e.g. SOX and FDCIA) and the cost of capital seems supported by bank data. However, we also caution that not all desirable attributes of earnings exhibit the desired negative relation with the cost of equity capital.

4 Earnings Quality and Bank Dividends

Abstract

We use our new country-specific index of bank earnings quality to examine the relation between earnings quality and bank dividends in 34 countries around the world. Consistent with our first hypothesis, we find that banks in countries with high earnings quality pay a greater proportion of their earnings, revenue, equity, assets, and cash flows in dividends. This result is robust to a number of institutional and bank-specific variables, and the potential endogeneity of earnings quality. In addition, while banks around the world seem to follow the traditional dividend smoothing policy, consistent with our second hypothesis, our result shows that the dividend-earnings link is stronger for banks in countries with high earnings quality. This finding supports the idea that earnings of banks in these countries are more sustainable and managers are quicker in incorporating them into dividends.

4.1 Introduction

The information content hypothesis proposes that dividends convey information about firms' earnings prospects. Miller and Modigliani (1961, 430) state that 'where a firm has adopted a policy of dividend stabilisation with a long established and generally appreciated "target payout ratio," investors are likely (and have a good reason) to interpret a change in dividend rate as a change in management's view of future prospects for the firm.' Empirical studies, mainly in the US, provide contradictory evidence on the relation between dividends and current/future earnings. The idea of a positive relation between dividend changes and subsequent earnings changes receives support, however weak, from Watts (1973), Gonedes (1978), and Penman (1983). However, the empirical evidence by Benartzi et al. (1997) and Grullon et al. (2002), among others, casts doubt on the ability

of dividends to signal information about future earnings changes. Contrary to the prediction of the cash flow signalling hypothesis, both studies find that earnings increases are associated with dividend decreases in the previous two years before dividend decreases.

However, stylised empirical evidence suggests that dividend decisions depend on management's assessment of the firm's long-run sustainable earnings and are, therefore, more likely to be associated with earnings quality. For example, Lintner's (1956) classic work suggests that managers are reluctant to increase dividends unless they believe that the new level of dividends is sustainable. An implication of this finding that has received little attention in the literature is that the relation between management's dividend policy, including changes in the level of dividends, depends on the quality of earnings.

In view of the weak evidence on the suggested link between dividend changes and earnings changes, a limited number of recent studies explore a potential link between dividends and various indicators of earnings quality. However, these studies are restricted to non-financial firms in the US. In addition, the studies draw conclusions from very restrictive and somewhat indirect indicators of earnings quality. For example, Skinner and Soltes (2011) find support for the idea that the relation between current earnings and future earnings is stronger for dividend paying firms than non-paying firms. Thus, their study only speaks to the differential persistence of earnings between dividend and non-dividend paying firms. In addition, while Caskey and Hanlon (2011) link dividends to earnings quality, their sample is restricted to US non-financial firms accused of committing accounting fraud, an external and restrictive indicator of earnings quality. In view of the multi-dimensional nature of the earnings quality construct, and the known possibility that different dimensions of earnings quality may result in different consequences, (see, for example, Dechow et al., 2010), these studies leave a gap in the literature.

Drawing motivation from accounting and banking literature on earnings management, we first construct a country-specific index of bank earnings quality that mirrors the country-specific earnings management measures by Leuz et al. (2003) and Bhattacharya et al. (2003).[1] Our composite earnings management index consists of individual elements that capture different dimensions of bank earnings quality: loss avoidance, income smoothing, and magnitude of accruals. We show that our aggregate earnings management index exhibits substantially high and correctly signed correlation with institutional factors and measures of transparency and opacity that literature suggests should correlate with earnings management. In the second part of the study, we use our validated index

[1] We use earnings management and earnings quality interchangeably in this paper. Therefore, low earnings management translates as high earnings quality.

to investigate two implications of earnings quality for bank dividend payout, measured in relation to various bank characteristics.

We hypothesise that banks in countries characterised by high (low) level of earnings quality (earnings management) pay higher dividends than banks in countries with low (high) level of earnings quality (earnings management). Using the Lintner (1956) and Fama and Babiak (1968) partial adjustment models, modified to include our measure of earnings quality, we provide further evidence on the relation between dividends and earnings quality by investigating the idea that the dividend-earnings relation is stronger for banks in countries characterised by high earnings quality compared to banks in countries with low earnings quality.

The findings reported in this chapter contribute to various strands of literature in many ways. First, to the best of our knowledge, this is the first paper that measures various dimensions of bank earnings quality to generate a composite country-specific earnings management score. While indexes of country-specific accounting quality exist in the literature, many of these indexes incorporate only the expected practices and do not measure actual earnings management behaviour of managers. However, while some country-specific earnings management indexes (e.g. Leuz et al., 2003; Bhattacharya et al., 2003) measure actual earnings management behaviour of managers, these indexes are developed using non-banking data and, as our results suggest, may not map completely with indexes generated from banking data. This may result because of the differences in regulatory environment of banks in different countries that may exert positive or negative influences on bank earnings management. Thus, our index complements bank regulatory database developed by Barth et al. (2001; 2008) and could be used to investigate the link between bank earnings quality and other important banking issues, such as cross-country variation in bank regulations, compensation policies, the cost of equity, valuation, bank ownership, capital investment efficiency, and bank governance, which are outside the scope of this study.

Our study also contributes to the extant literature in accounting and corporate finance exploring the implications of cross-country variation in institutional factors. For example, studies link cross-country differences in information asymmetry and agency problems to variation in dividend payout (La Porta et al., 2000) as well as market reactions to dividend changes and earnings changes (Dewenter and Warther, 1998). In addition, extant literature suggests a positive link between legal protection of minority shareholders and development of stock markets (La Porta et al., 1998), higher valuation (La Porta et al., 2002; Caprio et al., 2007), more active market for mergers and acquisition (Rossi

and Volpin, 2004) and lower earnings management (Leuz et al., 2003; Shen and Chih, 2005). Our study suggests that cross-country differences in earnings quality play a role in bank dividend payout and extends the influence of earnings quality beyond the cost of equity (Bhattacharya et al., 2003), capital investment efficiency (Biddle and Hilary, 2006), and firm valuation (Gaio and Raposo, 2011). To the best of our knowledge, this is the first cross-country study on the implications of bank earnings quality.

This chapter presents two key results relating to the objectives of the study. First, consistent with our hypothesis, after controlling for potential institutional influences and economic wide factors, such as legal system and investor protection, we find that better earnings quality is significantly and positively associated with bank dividend payout. This result is robust to different definitions of dividend payout and subsamples of the study. We further address the potential endogeneity bias inherent in the relation between bank dividends and earnings quality using two-stage least square (2SLS) method. Specifically, we use the rating on international accounting and auditing trends produced by the Center for International Financial Analysis and Research and a measure of market share of the Big 4 auditing firms (Francis and Wang, 2008) as instrumental variables for earnings quality. Our results support the primary finding of a positive relation between earnings quality and dividend payout, even after taking account of the possibility that earnings quality is endogenous.

Our second core finding supports the idea that the relation between bank dividends and earnings depends on the quality of earnings. Using the aggregate earnings quality index constructed in the first part of the study, we classify countries into two groups according to their earnings quality status relative to the median country earnings management. Using different specifications of the partial adjustment model (Lintner, 1956; Fama and Babiak, 1968) that incorporate interaction terms between earnings quality and dividend (and earnings) variables, we find evidence in support of the idea that earnings of banks in high earning quality countries (HEQCs) exhibit greater significant relation with lagged dividends (current earnings) variable. This evidence is consistent with the hypothesis that earnings of banks in HEQCs are more sustainable than earnings of banks in LEQCs, or that managers in the HEQCs are quicker in incorporating them into dividends.

While our results are important in better understanding the age-old question on the determinants of firms' dividend policy, it speaks to the more recent issue relating to the consequences of earnings quality.[2] In addition, it provides empirical support for the

[2] See Dechow et al. (2010) for a comprehensive review of the determinants and consequences of earnings quality.

suggestion by professionals, investors, and regulatory authorities on the governance role of dividends in mitigating problems associated with poor earnings quality. For example, Richard Breeden, the Worldcom's court appointed monitor states in the 2003 report on the corporate crisis that engulfed the company that "dividends are another method of gauging the reality of reported earnings. The ability to pay dividends is dependent on the availability of cash, and significant difference between the level of reported earnings and cash available for dividends would eventually be a red flag for potential problems." Thus, Breeden seems to suggest that strong relation between dividends and earnings quality. Our cross-country study suggests that the link between dividends and earnings quality is strongly supported by banking data.

The rest of the chapter is organised as follows. In Section 4.2, we discuss and present the main hypotheses of the study. Section 4.3 discusses the methodology adopted in the study, including the construction of earnings management index, data sources, sample construction, and definitions of research variables. Section 4.4 discusses the main empirical tests and results of the study while Section 4.5 concludes the chapter.

4.2 Relevant Research and Development of Hypotheses

A large volume of empirical studies investigates the information content of dividends in which managers use their dividend decisions to signal the future prospects of their firms. These studies rely on Miller and Modigliani (1961), who link the observed market reactions to dividend change announcements to the information contained in such dividends. Building on Miller and Modigliani (1961), a number of theoretical (signalling) models suggest specific dividend signals. The two leading candidates are cash flow changes and changes in investment policy. For example, Bhattacharya (1979) and Miller and Rock (1985) present different models supporting the idea that markets react favourably (unfavourably) to dividend increase (decrease) announcements because such announcements convey information about future cash flows. Asquith and Mullins Jr (1983) and Healy and Palepu (1988) find that significantly positive (negative) excess returns follow dividend increases (decreases). However, Benartzi et al. (1997) and Grullon et al. (2002) find no support for a positive relation between dividend changes and future earnings changes. Their results show that contrary to the prediction of the cash flow signalling hypothesis earnings increases do not follow dividend increases. Instead, dividend decreasing firms experience earnings increases in the two years following dividend decreases.

The weak evidence regarding the relation between dividend changes and earnings

changes is, however, not conclusive evidence against the signalling hypothesis. More recently, academics suggest new ways through which dividends may signal information about the quality of firms. In this regard, Grullon et al. (2002) suggest that dividend increasing firms experience subsequent reduction in profitability (and risk) because such firms are those in the maturity stage of their life cycle and are characterised by diminishing investment opportunity set. They find that firms increasing (decreasing) dividends experience reductions (increases) in market, size, and book to market betas consistent with the idea that dividends signal maturity of firms and the resulting change in their risk profile. The authors conclude that dividend increase (decrease) signal a significant decline (increase) in systematic risk of firms. Thus, while dividends may not signal changes in cash flows, Grullon et al. (2002) suggest that changes in dividends relate to changes in the riskiness and variability of cash flows.[3]

An evolving strand in the accounting literature seeks to link the quality of financial reporting to dividends. The study by Mikhail et al. (2003) appears to be the first but indirect evidence in this regard. The authors examine whether market reactions to dividend changes are associated with earnings quality, which they define as the extent to which past earnings are associated with future cash flows. They argue that while earnings and dividends are informative of future cash flows, dividend changes are a substitute source of information regarding future cash flows when earnings quality is low but relatively less informative when earnings quality is high. Thus, their study suggests that dividend changes are a credible proxy for earnings quality for firms with poor earnings quality. Consistent with analytical evidence predicting a negative relation between reactions to new information and the precision of previously released information, they document a negative relation between market reactions to dividend increases and earnings quality. However, they find no support for the subsample of dividend decreases. It is difficult to reconcile why dividend increases serve proxy for earnings quality while dividend decreases fail to perform such a role. In addition, as noted by Nissim (2003), their study fails to consider the multi-dimensional nature of the earnings quality construct. We argue that their market reactions study provides only necessary but insufficient evidence on the link between dividends and earnings quality, as it draws conclusion only from the demand side of the question (market reactions) and not the supply side (what determines changes in dividends).

Chen et al. (2007), provides further evidence on the role of financial accounting qual-

[3]Given that variability of cash flows is an instrument of earnings quality (Francis et al., 2004), even though not specifically stated by the authors, their study provides an indirect support for the link between dividends and earnings quality

ity around dividend change announcement. Using a modified Fama-French three-factor model that includes an accruals quality based information risk factor, the authors find evidence of market pricing of information risk around dividend change announcements. They find that dividend initiations (increases) are associated with a significant decrease (increase) in the pricing of information. In addition, consistent with Grullon et al. (2002), they find that dividend changes exhibit significant association with changes in the Fama and French systematic risk factors. However, Core et al. (2008) question the idea that accruals quality is a priced risk factor, the basic assumption of the study by Chen et al. (2007) that draws motivation from Francis et al. (2005).

Hanlon et al. (2007), Caskey and Hanlon (2011), and Skinner and Soltes (2011) provide some direct evidence on the relation between dividends and earnings quality. Hanlon et al. (2007) examine whether current returns reflect more information about future earnings for dividend paying firms versus non-paying firms.[4] They find evidence consistent with the fact that dividend-paying firms have significantly higher earnings response coefficients than non-dividend paying firms. They conclude that dividends play a signalling role other than serving as proxy for profitability. Caskey and Hanlon (2011) look at the relation between firms' dividend policy and earnings quality using an external indicator of earnings quality - firms accused of accounting fraud. They find that, relative to a matched group of firms not accused of accounting fraud, fraud-firms are less likely to pay dividends immediately prior to the alleged fraud years and less likely to increase dividends during the fraud period. In addition, they find that the dividend-earnings relation is weaker for fraud-firms relative to the non-fraud firms during the fraud period. They conclude that dividends signal information about earnings quality of firms.

Skinner and Soltes (2011) explore a number of stylised facts about the relation between dividends and earnings and the behaviour of managers towards dividend changes. They argue that the ''persistence parameter'' from Miller and Rock (1985) suggests that dividends should provide information about the extent to which current period changes in reported earnings are permanent. Thus, managers are motivated to increase dividends if they consider increases in earnings to be permanent (persistent or sustainable). Moreover, they argue that because management exhibit reluctance to cut dividends and are conservative with regard to increasing dividends, management's assessments of the sustainability of earnings (an attribute of earnings) should play a role in dividend decisions. Finally, combining ideas from the signalling theory and Lintner's (1956) observation of managers' inertia to reduce dividends, the authors argue that while income-increasing earnings ma-

[4]Thus, these authors relate value relevance attribute of earnings to dividends.

nipulation is attractive to managers, such a policy is potentially more costly as managers would later have to cut dividends, resulting in negative market reactions and loss of shareholder value at a future date. Consistent with this argument and the idea that dividends provide information about the quality of reported earnings, they find that the relation between current earnings and future earnings is stronger for dividend-paying firms. However, Dechow and Schrand (2004) note that while persistence is a desirable attribute of earnings quality, it fails to capture enough dimensions of this multi-dimensional construct. They argue that a firm that experiences a transitory shock to earnings would have low earnings persistence but could still have earnings that accurately reflect the company's current operating performance.

Apart from the limitations of the individual studies discussed above, at least two additional common denominators make the results that they present restrictive. First, because these studies draw evidence from the US, the question remains whether earnings quality plays a role in dividend policy around the world. Second, as usual in finance studies, none of the studies considers whether earnings quality plays a role in banks dividend decision, especially given the fact that regulatory and supervisory environment of banks may subsume any potential role that earnings quality may play in dividend decision. We examine whether earnings quality explains the variation in the magnitude of dividend payments (rather than the decision to pay) by banks in 34 countries across the world. Specifically, we test the following hypothesis, stated in its alternative form:

H1: Banks in countries with high earnings quality (low earnings management) pay higher dividends than banks in countries with low earnings quality (high earnings management)

While the various studies discussed above support the direction of the relation between earnings quality and magnitude of dividends payments, at least, three additional arguments support this positive relationship. First, in perfect financial markets where there is no agency problem, managers should return excess capital requirements to the capital suppliers, through dividend payments or similar other payout channel like share repurchase. However, contrary to expectation, Blanchard et al. (1994) find that managers tend to invest in unrelated projects that typically fail. Biddle and Hilary (2006) argue that if higher quality accounting permitted perfect monitoring, then no agency problem would arise. We argue that such perfect monitoring should reveal better mapping of dividends and earnings. Therefore, while earnings and dividends may exhibit weak and

perhaps negative relation because of agency problem, a reduction in agency problem through higher earnings quality should mitigate the expropriation of cash culminating in higher dividends. Secondly, the high regulation of banks also supports the predicted positive relation between the magnitude of dividends and earnings quality. We argue that banks in countries with high level of earnings management (low earnings quality) should face higher regulatory and supervisory constraints, ceteris paribus. The high regulation and supervision requirements constrain investment opportunity set of banks and reduce their financial flexibility resulting in lower dividends. Finally, the positive relation between earnings quality and ratio of cash flows to earnings suggests a positive relation between earnings quality and dividends as, given the same level of earnings, a higher earnings quality suggests lower accruals and higher cash flows, from which dividends are paid. It is for this reason that academics and professionals, such as Breeden (2003) and Malkiel (2003), consider dividends as proxy for earnings quality.[5]

Lintner (1956) provides evidence supporting a link between dividends and current earnings. Fama and Babiak (1968) extend the relation to include lagged earnings. In line with these studies, Sibley and Hobson (1979) indicate that the partial adjustment model explains a higher variation of bank dividend changes than do several other forecasting models. While we are not aware of any cross-country study that uses this model, we are aware of its use outside the US (e.g. Gugler and Yurtoglu, 2003) and, in particular, in the analysis of bank dividend behaviour (e.g. Morgan and Saint-Pierre, 1978; Foerster and Sapp, 2006). Therefore, we assume that the Lintner (1956) and Fama and Babiak (1968) models are adequate characterisations of bank dividend behaviour. Because manipulation of earnings is more likely in countries characterised by low earnings quality, we argue that, if earnings quality plays a role in bank dividend policy, there should be a significant difference in the dividend-earnings link between banks operating in high earnings quality countries and banks operating in low earnings quality countries. Specifically, earnings of banks operating in countries with high earnings quality should exhibit a stronger relation with dividends as management private knowledge and assessment about their firm's earnings quality influence their dividend decision, especially the decision to change the level of dividends. This suggests our second hypothesis stated in its alternative form:

H2: The relation between dividends and earnings (dividend-earnings link) is stronger

[5]We acknowledge that different dimensions of earnings quality may exhibit different relations with the variable of interest (see, for example, Dechow et al., 2010). For example, a more conservative accounting that is associated with greater earnings quality and lower earnings may exhibit a negative relation with dividends payout.

for banks in countries with high earnings quality than for banks in countries with low earnings quality.

4.3 Methodology

4.3.1 Earnings Quality and Dividend Link: Model Specification

Hypothesis 1 (H1) suggests a link between bank dividend payout and earnings quality. We provide evidence on this link using the following baseline model:

$$DIV_j = \alpha_0 + \alpha_1 AEQ_j + \alpha_2 LAW_j + \alpha_3 PROTECT_j + \alpha_4 LnGDP_j + \alpha_5 SIZE_j + \varepsilon_j \quad (4.3.1)$$

where j is the country subscript, DIV is dividend payout, measured as the average dividend payout over the period of the study; AEQ is the aggregate earnings quality score. LAW and PROTECT are the control variables for legal system and investor protection, respectively. LnGDP and SIZE are control variables for economic wide factors that may explain cross-country variation in dividend payout. We provide further justifications for the inclusion and measurement of these variables in Section 4.3.4 below.

4.3.2 Dividend-Earnings Relation: Model Specifications

We use the Lintner (1956) and Fama-Babiak (1968) models to test the hypothesis (H2) that banks operating in high earnings quality countries (HEQCs) have a stronger dividend-earnings relation than banks operating in low earnings quality countries (LEQCs).

The Lintner model which is widely adopted in studying the relation between dividends and earnings (e.g. Watts, 1973; Choe, 1990; Brav et al., 2005) characterises dividend policy by a target payout ratio and the percentage adjustment to that target rate in each period. It builds on the empirical observation that a firm's desired current period dividends,D_t^*, is equal to the target payout ratio, k, times the current earnings (E_t). That is, $D_t^* = kE_t$. In addition, the model assumes that current period dividends partially adjust to the desired payout level. Although firms have a long-run payout ratio, if firms are conservative in their dividend decisions, they make only a partial adjustment to dividends as earnings increase. In summary, Lintner (1956) suggests that the change in dividends for firm i in year t ($\triangle D_{i,t}$) is proportional to the difference between target dividends ($D_{i,t}^*$) and the previous period dividends ($D_{i,t-1}$). That is,

$$\triangle D_{i,t} = D_{i,t} - D_{i,t-1} = a + ckE_{i,t} - cD_{i,t-1} + \varepsilon_{i,t} \quad (4.3.2)$$

where i and t are the bank and time subscripts, respectively. D is the dividends per share, E is the earnings per share, k is the payout ratio, and c is the adjustment factor. Following the usual empirical method, we first estimate the empirical version of Model 4.3.2

$$\triangle D_{i,t} = \alpha_0 + \alpha_1 E_{i,t} + \alpha_2 D_{i,t-1} + \varepsilon_{i,t} \tag{4.3.3}$$

The partial adjustment model predicts a positive and negative coefficient on the earnings and dividend variables, respectively. Foerster and Sapp (2006) note that α_2, the 'speed of adjustment,' will be more negative if the changes in current earnings are, by management's assessment, a good reflection of the firm's long-run sustainable earnings or managers more rapidly incorporate them into dividends. Therefore, we expect that banks operating in countries with better earnings quality will have more negative α_2 than banks operating in countries with low quality of earnings.

Therefore, to test the hypothesis that banks in countries with higher earnings quality exhibit a stronger dividend-earnings relation we modify Model 4.3.3 by including various interaction effects. Specifically, we test the following model:[6]

$$\triangle D_{i,t} = \alpha_0 + \alpha_1 EPS_{i,t} + \alpha_2 D_{i,t-1} + \alpha_3 EQ_j + \alpha_4 EPS_{i,t} \times EQ_j + \alpha_5 D_{i,t-1} \times EQ_j + \varepsilon_{i,t} \tag{4.3.4}$$

where EQ_j is a dummy variable that takes the value of 1 if the aggregate earnings management score for the country in which the bank is incorporated is less than the median aggregate earnings management score and 0, otherwise. The interaction variables, $EPS_{i,t} \times EQ_j$ and $D_{i,t-1} \times EQ_j$, capture the interaction effect of earnings quality on the relation between dividend changes and earnings and the relation between dividend changes and lagged dividends, respectively. Hypothesis 2 predicts a significant positive value for α_4, consistent with the idea that earnings of banks in HEQCs have a stronger positive relation with dividend changes than earnings of banks in LEQCs. In addition, we expect a significant and negative coefficient for α_5, consistent with the idea that earnings in HEQCs better reflect earnings quality and are more rapidly incorporated into dividends.

Fama and Babiak (1968) suggest modifications to the original Lintner's partial adjustment model. They provide simulation results supporting a model that excludes the intercept term and includes the lagged value of earnings variable ($EPS_{i,t-1}$) as follows:

[6] Caskey and Hanlon (2005) adopt a similar model to study the differences in the earnings-dividend link between US firms alleged to have committed fraud, an external indicator of earnings quality, and a matched sample of non-fraud companies

$$\triangle D_{i,t} = \alpha_1 EPS_{i,t} + \alpha_2 EPS_{i,t-1} + \alpha_3 D_{i,t-1} + \varepsilon_{i,t} \tag{4.3.5}$$

In line with these modifications, we also test the following alternative partial adjustment model that includes interaction terms:

$$\begin{aligned} \triangle D_{i,t} &= \alpha_0 + \alpha_1 EPS_{i,t} + \alpha_2 EPS_{i,t-1} + \alpha_3 D_{i,t-1} + \alpha_4 EQ_j + \alpha_5 EPS_{i,t} \times EQ_j \\ &\quad + \alpha_6 EPS_{i,t-1} \times EQ_j + \alpha_7 D_{i,t-1} \times EQ_j + \varepsilon_{i,t} \end{aligned} \tag{4.3.6}$$

All variables are as defined earlier. As with Equation 4.3.4, Equation 4.3.6 tests the differential effect of earnings quality on the dividend-earnings relation for banks in HEQCs compared to banks in LEQCs. Thus, we include an intercept term in the specification. In line with Hypothesis 2, we expect a significant positive coefficients for α_5 and α_6, consistent with the idea of a stronger dividend-earnings relation for banks in HEQCs than for banks in LEQCs. In addition, we also expect a significant and negative coefficient for α_7, consistent with the idea that earnings in HEQCs are better reflection of earnings quality and are more rapidly incorporated into dividends. Thus, in Equations 4.3.4 and 4.3.6, we allow the coefficients on the lagged dividends and earnings variables to vary depending on whether banks belong in countries with high earnings quality or countries with low earnings quality. We estimate the equations over the pooled sample of banks and provide robustness checks using annual cross-sectional regressions (Fama and MacBeth, 1973).

4.3.3 An Earnings Quality Index

We first describe the measures of earnings quality dimensions used in constructing our country-specific index. While our formal conceptualisation of aggregate earnings quality index and its components draw largely from the literature on industrial firms, we address the differences in accounting between banks and industrial firms in operationalising the elements of this construct. Therefore, our index of country-specific earnings quality is bank-specific and may not be adequate outside the banking industry. Consistent with the objective of this study, our earnings quality index attempts to indicate relative ranking of countries that mirrors the widespread perception of country ranking on transparency and opacity.

Following Bhattacharya et al. (2003) and Leuz et al. (2003), we consider three di-

mensions of country-specific earnings quality measures that capture management's discretions. In particular, we consider loss avoidance, income smoothing, and magnitude of accruals. These measures reflect different dimensions along which insiders can exercise their discretion to manage reported earnings. As Leuz et al. (2003) argue, these measures capture outcomes of insiders' earnings management activities thus avoiding the problem of drawing empirical evidence based on stated accounting standards, which could be circumvented by insiders.

4.3.3.1 Loss Avoidance

Burgstahler and Dichev (1997) and Degeorge et al. (1999) provide evidence supporting the proposition that US firms engage in earnings management through benchmark beating - avoiding loss and/or just beating prior year's earnings. According to Bhattacharya et al. (2003), such loss avoidance behaviour obscures the mapping of earnings and economic performance, resulting in less transparent earnings. Evidence also suggests that the high regulation of banks may not fully mitigate the incidence of earnings management through loss avoidance. For example, Beatty et al. (2002) and Altamuro and Beatty (2010) argue that bank managers have incentives to manage earnings through benchmark beating. They find that relative to private banks, public banks are more likely to use loan loss provisions (and realised securities gains and losses) to eliminate small earnings decreases. Even though the incidence of benchmark beating seems to have reduced in the US after the introduction of Federal Deposit Insurance Corporation Improvement Act (FDICIA), the study by Altamuro and Beatty (2010) fails to rule out the existence of benchmark beating. In addition, a cross-country study by Shen and Chih (2005), which employs thresholds of zero earnings and zero earnings change, examines whether evidence of earnings management exists across 48 countries. They find that banks in more than two-third of the 48 countries exhibit earnings management through loss avoidance. Thus, benchmark beating by banking and non-banking firms appears to be an international phenomenon.

Following Bhattacharya et al. (2003) and Biddle and Hilary (2006), we measure loss avoidance (LOSS) as the number of banks with small positive earnings minus the number banks with small negative earnings d ivided by the sum of the two. Burgstahler and Dichev (1997) suggest a cut-off range of [0.00, 0.01] and [-0.01, 0.00] for small positive earnings and small negative earnings, respectively (see, also, Bhattacharya et al., 2003; Leuz et al., 2003). However, applying this cut-off to our bank data results in the classification of about 46% of our data as either small positive earnings or small negative earnings, which

is inconsistent with the population that we intend to capture. Therefore, we follow Kanagaretham et al. (2010) and use a cut-off of 0.2% at each end of the distribution. Thus, we define small positive earnings as earnings after tax normalised by total assets in the range [0.000, 0.002] and small negative earnings as earnings after tax normalised by total assets in the range of [-0.002, 0.000]. Only 14% of our sampled banks meet this criterion. A higher value of LOSS indicates a higher incidence of loss avoidance, consistent with higher level of earnings management and lower earnings quality.

4.3.3.2 Income Smoothing

Income smoothing refers to the deliberate reduction in the fluctuation of earnings with respect to some normal levels. Insiders can use accounting discretion to conceal economic shocks to operating cash flows by accelerating the reporting of future revenues or delaying the reporting of current cost to obscure poor current performance. Conversely, insiders may misreport strong current performance to create reserves for the future. In either case, accounting accruals provide a "handy tool" to hide cash flow shock.

While evidence of income smoothing is pervasive in the accounting literature, the argument is whether such income smoothing behaviour improves the information content of earnings by revealing innate fundamentals or whether it obscures these fundamentals and thus reduces the informational quality of earnings. For example, Sankar and Subramanyam (2001) and Arya et al. (2003) argue that income smoothing reveals information about the fundamental earnings process of a firm. On the other hand, Lang et al. (2003) argue that income smoothing distorts information and results in less transparent earnings (see, also, Leuz et al., 2003).

The controversy surrounding the desirability or otherwise of income smoothing also resonates in the banking literature. Some authors argue that the increase in risk during good economic times makes it a desirable policy for banks to increase loan loss reserves in good economic times to mitigate credit crunches in bad times (see, for example, Borio et al., 2001). They argue that to the extent that such provisioning leads to smoother earnings, income smoothing is desirable as it increases the informational quality of earnings by signalling the risk attached to a bank's loan portfolio. However, in the absence of any empirical evidence, it is difficult to associate any observed income smoothing behaviour to management's assessment of current and future risk profile of the loan portfolios as this may, in fact, reflect an attempt by management to obscure their risk-taking behaviour (see, Laeven and Majnoni, 2003; Bikker and Metzemakers, 2005). Overall, Bushman and Williams (2009) show that earnings smoothing by banks leads to less informative earnings

and produces accounting information that appears to be less effective in facilitating the ability of outside investors and regulators to monitor and discipline bank risk-taking. This violates the decision usefulness of accounting information and runs contrary to a stated objective of International Financial Reporting Standards.

Many studies relating to non-financial firms use the correlation between (change in) accruals and (change in) operating cash flow as a measure of income smoothing behaviour of firms. However, measuring accruals for banks is an empirical challenge in view of the largely unavailable bank data required to estimate extant accrual models. We measure accruals (ACC) using the Yasuda et al.'s (2004) bank-specific accrual model:

$$ACC_{i,t} = EXPL_{i,t} + GLSS_{i,t} + NCREV_{i,t} - NCEX_{i,t} \tag{4.3.7}$$

where i and t are the bank and time subscripts, respectively. EXPL are extraordinary profits and losses, GLSS are gains and losses on sales of securities, NCREV are non-cash revenues and NCEX are non-cash expenses. We measure NCEX as the addition of loan loss provisions, gross charge-off, and other operating expenses and set NCREV to zero for all bank-year observations due to their non-availability in the BankScope database that we use. We calculate operating cash flows (OCF) as the difference between operating income and ACC. We obtain income smoothing (SMOOTH) as the spearman correlation between change in operating cash flows and change in accruals, both normalised by beginning total assets. We use the pooled sample of banks in each country over the period of the study. While a negative correlation between accruals and operating cash flows is a natural consequence of the accrual accounting process, a more negative correlation indicates a greater likelihood that managers engage in earnings management through income smoothing.

4.3.3.3 Magnitude of Accruals - Loan Loss Provisions

While, in principle, the objective of loan loss provisions is to adjust loan loss reserves to reflect expected future losses on loan portfolios, evidence exists that bank management also have incentives to use and seem to use loan loss provisions to manage earnings. Wahlen (1994) shows that managers increase discretionary loan loss provisions when they expect an increase in future cash flows. Fonseca and Gonzalez (2008) argue that the moral hazard problem associated with the incentive for banks to shift-risk also suggests greater incentive for management to hide their risk shifting through their discretionary loan loss provisioning. Thus, loan loss provisions reflect both an element of management's judgment with respect to the level of bad loans (non-discretionary) and a discretionary

element that management may use as a smoothing vehicle. Similar in spirit with Beatty et al. (2002) and Cornett et al. (2009), we use the pooled set of banks in each country and estimate the following non-discretionary loan loss provisions model.

$$\begin{aligned} LLP_{i,t} &= \alpha_0 + \alpha_1 EBTP_{i,t} + \alpha_2 CHGLOAN_{i,t} + \alpha_3 LOAN_{i,t} + \alpha_4 LLR_{i,t} \\ &\quad + \alpha_5 LCO_{i,t} + \alpha_6 NPL_{i,t} + \alpha_7 \sum_{t=1996}^{2006} YEAR_t + \varepsilon_{i,t} \end{aligned} \tag{4.3.8}$$

where i and t are the bank and time subscripts, respectively. LLP is the loan loss provisions; LOAN (CHGLOAN) is the (change in) total loans; LLR is the loan loss allowance; EBTP is the earnings before tax and loan loss provisions; LCO is the net charge-off and NPL is the non-performing loans. We include loan loss reserves to control for non-discretionary components of LLP. We scale all variables by the beginning period total assets. We measure discretional accruals (ABSLLP) as the country median of the absolute value of the error term of the non-discretionary LLP model in Equation 4.3.8 above. We use the absolute value of accruals to capture the effect of both income increasing and income decreasing earnings management through accruals. The higher the value of ABSLLP the higher the extent of earnings management in a country.

As loan loss provisioning represents only one, though substantially important, vehicle for bank earnings management through accruals, we also measure accruals using the country median of the absolute value of accruals using Equation 4.3.7 above. We argue that a high level of accruals is predictive of high earnings management (low earnings quality) and suggestive of earnings that are more likely to reverse, resulting in future restatement.[7] We call this variable MACC. Higher values of MACC indicate higher values of total accruals and lower earnings quality.

4.3.3.4 Overall Earnings Management Measure

Because we are unsure which dimension of earnings management is (more) significant in capturing the quality of earnings, to mitigate the potential measurement error associated with our individual measures, we aggregate the four earnings management measures into a summary score. We construct the summary measure as the average of the individual ranks on LOSS, SMOOTH, ABSLLP, and MACC. That is, we rank all the values of LOSS of all countries with ranks taking a value between 1 and 34. We do the same for values of

[7] Our index produces a similar ranking when we used growth in accruals rather than the level of accruals.

SMOOTH, ABSLLP, and MACC.[8] The country-specific index of earnings management is the sum of the ranks for country i divided by 4. Higher ranks on individual measures and resulting summary scores indicate higher level of earnings management and lower earnings quality. Formally, aggregate earnings management for country j (AEM_j) is given by:

$$AEM_j = [Rank(MACC_j) + Rank(LOSS_j) + Rank(SMOOTH_j) + Rank(ABSLLP_j)]/4 \quad (4.3.9)$$

Thus, we define aggregate earnings quality (AEQ) as the negative of aggregate earnings management score (AEM).

4.3.4 Definitions of Other Variables

4.3.4.1 Dividend Payout

Traditionally, a firm's dividend payout represents the proportion of current earnings paid out in dividends. However, since we are dealing with accounting data of banks in countries with different accounting practices and standards, to mitigate the potential bias in the measurement of earnings that may result from differences in accounting, we consider alternative definitions of dividend payout. We consider two measures of dividend payout (dividend-to-earnings ratio - DTE and dividend-to-cash-flow ratio - DTCF) from La Porta et al. (2000). These authors argue in favour of the use of dividend-to-cash-flow measure since it has a natural economic meaning being the ratio of cash distributed to cash generated during a given period. The use of dividend-to-earnings and dividend-to-cash-flow ratios suggests that, as expected, bank managers rationally consider both the level of current earnings and cash flows in setting the dividend policy. However, the dividend-to-cash-flow measure also presents a challenge for cross-country studies as it depends on a country's accounting conventions that may affect the determination of accruals and cash flows, thus making cross-country comparison less precise. In addition, managers may easily manipulate earnings and cash flows and diversion of resources may occur before reporting earnings or cash flows. If this is the case, these two ratios may overestimate the share of true earnings or cash flows paid out as dividends. Because of this, we also present results based on three additional measures of dividend payout.

The use of dividend-to-equity ratio is intuitively appealing and underlines the importance of equity capital in banking. Although it does not lend itself to easy interpretation,

[8] Since more negative SMOOTH variable indicates more smoothing, in ranking SMOOTH, we take the negative values such that high values of SMOOTH indicate higher earnings management.

we use revenue as a deflator of dividends as revenue is more difficult to manipulate through accounting practices. We define revenue as the sum of a bank's interest and dividend income. The use of dividend-to-asset ratio is motivated by Allen and Michaely (2003) and Li and Zhao (2008) and ensures that results are not affected by dividend paying banks with negative earnings. Like the equity based measure, the dividend-to-asset ratio is also appealing in banking as regulatory authorities are interested in the level of bank assets for capital regulatory purpose, which may involve restriction of dividends. We use the average of these measures over the period of the study for our country-level (bank-level) regressions.

4.3.4.2 Control Variables

While our primary interest is in the proposed earnings quality variable, empirical evidence suggests additional institutional, economic wide, and firm-level factors that may exert significant influence on dividend payments and/or earnings quality. We consider the influence of the following factors on bank dividend payout:

Legal System: Evidence suggests that the legal environment of firms' country of incorporation determines their corporate policy behaviour. For example, La Porta et al. (2000) provide evidence that firms incorporated in common law countries pay higher dividends compared to firms incorporated in civil law countries. Ferris et al. (2009) find evidence of international presence of dividend catering across a sample of common law countries but not for those in civil law countries. We measure legal system (LAW) using a binary variable that takes the value of 1 for common law countries and 0 for civil law countries. We obtain this measure from La Porta et al. (2000), and in line with their study, we expect a positive relation between dividend payout and LAW.[9]

Investor Protection: Investor protection mitigates the tendency to expropriate minority shareholders and creditors within the constraints imposed by law. Even though their sample excludes financial institutions, La Porta et al. (2000) argue and show that consistent with the "outcome" agency model of dividends, firms in countries with high investor protection, including stronger minority shareholder rights, pay higher dividends compared to firms in countries with low investor protection. We measure investor protection (PROTECT) as the sum of three variables from La Porta et al. (1998): rights of minority shareholders (antidirector), creditors' rights, and legal enforcement. Higher values of these variables indicate stronger protection of shareholders, creditors, and stronger legal

[9]While we appreciate the differences even among civil law countries, because of the limitation in the availability of data for some of these countries, we do not consider the variation within this subgroup.

enforcement. We expect a positive relation between dividend payout and PROTECT.

Per capita GDP: We control for the potential influence of economic wide factor on bank dividend payout using the log of the average per capita GDP (LnGDP) over the period of the study. We obtain the data on per capita GDP from the World Bank database.[10] We predict a positive relation between dividend payout and LnGDP as banks in countries with greater national output are likely to pay higher dividends.

Profitability: Using a cross-country sample of firms, Denis and Osobov (2008) find evidence of a positive relation between firm profitability and propensity to pay dividend. We measure profitability (ROE) as the average of ratio of earnings after tax to book value of total equity over the period of the study. Consistent with literature, we predict a positive relation between dividend payout and ROE.

Investment Opportunities: While not perfect, it is traditional to measure firm's growth prospect using Tobin's Q or the market to book ratio. However, because our sample consists of private and public banks, we are unable to use either of these variables. As retention of earnings and issue of new equity are likely to rank high in financing investment opportunities, we measure growth opportunities (GROWTH) as the average annual change in book value of equity over the period of the study. Consistent with prior studies (e.g. Denis and Osobov, 2008), we expect a negative relation between bank dividend payout and GROWTH.

Capital Adequacy: Empirical evidence suggests that bank earnings quality is a function of bank capital adequacy. For example, Ahmed et al. (1999) provide evidence in support that banks use of loan loss provisions, an important element of bank accruals, in earnings management. In addition, the high regulatory environment of banks impact greatly on the level of dividend payout as regulators may exercise their oversight powers by curtailing dividend payments by banks with low capital ratio. We control for the regulation and bank capital adequacy using the ratio of book value of capital to total assets (CAPR). As we expect banks with more capital relative to the value of their assets to be under less pressure from regulatory authorities to reduce dividends, we predict a positive relation between bank dividend payout and CAPR.[11]

Dividend Tax Advantage: Using the dividend tax advantage (DTA) variable in La Porta et al. (2000), we also control for the possibility that differences in the treatment of dividend tax in different jurisdictions may explain the differences in dividend payout across countries. However, as noted by La Porta et al. (2000) the question regarding the role of

[10] Available from http://data.worldbank.org/indicator/NY.GDP.PCAP.CD/countries/1W?display=default

[11] As this measure also reliably captures the risk profile of banks we do not include a separate risk variable in our regressions.

dividend tax on dividend payment is unsettled. While the traditional view suggests that the double taxation regime (for example, in the US) deter dividend payment by firms, more recent studies suggest that taxes do not deter dividend payments as shareholders have no preference for the timing of dividends (see, for example, Harris et al., 2001). In view of this controversy, we are agnostic regarding the direction of the relation between dividend payout and DTA.

4.3.5 Sample Selection and Data Sources

Our initial sampling frame consists of the 48 countries listed in La Porta et al. (1998). However, data requirements on institutional variables restrict the number of countries included in the final sample to 34 countries, which include developed and emerging economies around the world. We obtain financial data for the sample of private and public banks incorporated in these countries for the period 1996-2006 from the commercially available and widely used BankScope database (see, for example, Lepetit et al., 2008; Kanagaretham et al., 2010).

One difficulty with the use of BankScope database, however, is that it does not provide a single unique financial statement per bank over the entire sample period; it provides new separate time series data for a bank following a change in the accounting or consolidation rules. Therefore, for many banks, several different financial statements are available for a given reporting period. In addition, while it provides both consolidated and unconsolidated accounts for some banks, it provides either consolidated or unconsolidated accounts for others. Even though we believe that consolidated accounts are more informative, our attempt to use either the consolidated accounts or the unconsolidated accounts results in great loss of data. This is of particular concern since the reliability of earnings quality measures increases with the number of data points. Because of these and other special features of the data, we follow the procedure below to build the data set that we use in the study:

1. To make the data more comparable across countries we obtain data from the "Universal Bank Model" provided by BankScope. Unlike the raw data, this model places different accounting systems on a similar and comparable basis. Even though most of the variables that we use in this study are ratios, since the dataset consists of various currency areas, to mitigate potential currency effect we convert all variables to US dollar using the facility provided within BankScope. For the purpose of this conversion, we use the closing rate for the fiscal year corresponding to the bank's

fiscal year end.[12]

2. To avoid duplication that may arise from the use of unconsolidated accounts prepared separately for each parent bank without regard to its subsidiaries, for each bank-year, we first select an accounting report if it is described as 'consolidated statements.' These are the consolidation codes C1 and C2 labelled "Institution" by BankScope. We do not use additional consolidated accounts which are available under the label C* as these are mainly restatements to original accounts sometimes resulting from a change in accounting standards, errors, or accounting frauds. Our preference for consolidated data helps to mitigate the effect of the possible distortion from off-balance-sheet operations that are inherent in some countries. However, where consolidated statements are unavailable we use unconsolidated statements.

3. We delete bank-year observations relating to banks other than those described as commercial bank, bank holding company, cooperative bank, savings bank, or investment bank.

4. Finally, for the sample used in constructing the earnings quality measures, we delete all bank-year observations for which there are missing values for a number of financial data, such as net income, loan loss provisions, loans, and loan loss reserves required in constructing the country-specific earnings quality measures. However, we do not exclude these banks in calculating other country-specific measures such as dividend payout. For this reason, the earnings quality sample used in the construction of the earnings quality measures varies from the dividend sample that we use to test our hypothesis.

The sampling procedure above results in over 20000 banks and 140000 bank-year observations that we use to construct an index of earnings quality for 34 countries. Columns 3 and 4 of Table 4.2 provides a breakdown of the number of banks and bank-year observations per country as well as other descriptive statistics classified, initially, according to legal system of countries. As evident in this table, US banks make up about 58% (62%) of our bank (bank-year) observations, while Finland has the least number of banks (25) and bank-year (130) observations. We address the empirical implication of the disproportionately large number of US bank (bank-year) observations in the appropriate section of this study.

[12]Our results were qualitatively similar when we use real data instead of nominal data.

4.3.6 Earnings Management Measures: Empirical Validity

As the reliability of our tests depends on the validity of our bank earnings management measures, we begin our analysis by assessing the validity of these measures. While some elements of our index enjoy patronage in recent cross-country studies on earnings management, in view of the differences in data sources, the possible differences in earnings generating process of banks, and the inclusion of other bank-specific measures, we subject our measures to empirical validity. We examine the relation between our individual measures and composite measure of earnings management and existing country-specific indicators of transparency and opacity. We expect that a good measure of earnings management should be negatively related to measures of transparency and positively related to other measures of opacity.

Wysocki (2009) argues that earnings quality should exhibit a positive relation with accounting standards, disclosure level, investor rights, and legal enforcement as these factors limit the incentive and the ability of firms to distort reported earnings. In addition, Leuz et al. (2003) find that firms in countries with developed equity markets, dispersed ownership structures, strong investor rights, and legal enforcement engage in less earnings management. However, while Bhattacharya et al. (2003) also argue that legal origin of firms, disclosure level, adoption of international accounting standards, and auditors per capita should exhibit negative and significant relation with a valid measure of earnings management, none of their earnings management variables exhibits a consistent relation with these institutional variables.

With regard to banks, Fonseca and Gonzalez (2008) show that earnings management, through income smoothing, is a function of bank regulation and supervision, investor protection, transparency in accounting, disclosure level, financial structure, and financial development (see, also, Kanagaretham et al., 2010). Thus, these studies suggest an overlap among the drivers of earnings quality for banking and non-banking firms.

Following these studies, we assess our measures of earnings management against legal origin (LAW) and disclosure level (DISC) of sampled countries. We expect a negative relation between individual (and aggregate) measures of earnings management and LAW and DISC, consistent with the argument that common law system and greater level of disclosure increase transparency, thus reducing earnings management.

In addition, we also benchmark our measures against the 2004 edition of PricewaterhouseCoopers (Kurtzman Group) Opacity Index. The proprietors of this index, which we name (OPA), argue that it measures the degree to which countries lack clear, accurate, easily discernible and widely accepted practices governing the relationships among busi-

ness, investors and governments. Finally, we also use the percentage of market share by the Big 4 accounting firms, which we obtain from Francis and Wang (2008). These authors argue that Big 4 auditors are more sensitive to the cost of client misreporting and its effect on auditor reputation and are more likely to enforce higher earnings quality. We expect our earnings management variables to correlate positively with opacity (OPA) and negatively with the market share of Big 4 auditors (BIG4).[13]

Table 4.1 presents the Pearson correlation matrix for earnings management, transparency, and opacity measures. As expected, ABSLLP is positively and significantly associated with MACC. However, the low correlation between these variables also suggests that they capture different dimensions of earnings management through accruals. The SMOOTH variable exhibits the expected negative relation with LOSS and MACC. However, none of these relations is statistically significant at the conventional levels. SMOOTH is positively but insignificantly correlated with ABSLLP. The LOSS variable also fails to exhibit consistently significant relation with other measures of earnings management, even though it exhibits a correctly signed positive relation with MACC. While the incorrectly signed and weak relation between some of the pairs of earnings management measures are a potential cause for concern, these results are not entirely surprising as Dechow et al. (2010) note the possibility of a negative correlation between pairs of earnings quality measures in view of the fact that they measure different dimensions of earnings. However, these incorrectly signed and weak correlations may also be due to measurement error. For example, only the US provides a relatively large sample for a more reliable measurement of the variables, especially the LOSS variable. If measurement error explains the weak correlations among the earnings management measures, then their direct use in our regressions would bias our coefficients towards zero. In the light of this evidence, we place more importance on the aggregate earnings management measure, which exhibits consistently significant and positive relation with individual measures of earnings quality and, most importantly, the expected strong negative (positive) correlation with our measures of transparency (opacity).

The results presented in this table are important for at least two reasons. First, the results give credibility to our measures of country-specific earnings management especially the MACC variable. To the best of our knowledge, this is the first study that uses this specific measure to capture country-specific accruals. Second, the significant relation between legal origin of countries and the level of earnings management also suggests the

[13] See, also, Kanagaretham et al. (2010) on the role of auditor reputation in constraining earnings management in a sample of 21 countries.

Table 4.1: Correlation Matrix of Earnings Management, Transparency, and Opacity Measures

	LOSS	MACC	SMOOTH	ABSLLP	AEM	LAW	DISC	OPA	BIG4
LOSS	1								
MACC	0.234	1							
SMOOTH	-0.126	-0.190	1						
ABSLLP	-0.217	0.330*	0.252	1					
AEM	0.455***	0.739***	0.467***	0.431*	1				
LAW	-0.130	-0.398**	-0.344**	0.016	-0.366*	1			
DISC	-0.192	-0.391**	0.377*	-0.714***	-0.508***	-0.045	1		
OPA	0.071	0.331*	-0.224**	0.693***	0.443***	-0.130	-0.841***	1	
BIG4	-0.349*	-0.495***	-0.003	-0.172	-0.519***	0.229	-0.573***	-0.401***	1

The table presents the correlation coefficients among earnings management measures and other country-specific measures of transparency and opacity. LOSS is the number of banks with small positive earnings minus the number banks with small negative earnings divided by the sum of the two. Small positive earnings is defined as earnings after tax normalised by total assets in the range [0.000, 0.002] and small negative earnings is defined as earnings after tax normalised by total assets in the range of [-0.002, 0.000]. ABSLLP measures the magnitude of discretionary accruals and is the country median of the absolute value of error terms from the non-discretionary loan loss provisions model (Equation 4.3.8). MACC is the country median of magnitude of total accruals - obtained from the Yasuda' et al's (2004) bank-specific accrual model. SMOOTH measures income smoothing- the Spearman correlation coefficient between change in accruals and change in operating cash flows, where the value of accruals is derived from the Yasuda et al.'s (2004) model and operating cash flows is the difference between operating income and accruals. AEM is the aggregate earnings management score obtained by taking the average of the ranks of LOSS, ABSLLP, MACC and SMOOTH for each country. Higher values of ABSLLP, MACC, LOSS, AEM, and lower values of SMOOTH imply higher earnings management and lower earnings quality. Data used in constructing all variables are from BankScope (1996-2006). OPA is the Kurtzman Group (2004)/PricewaterCoopers Opacity Index. LAW measures the legal system of a country - equals 1 for common law countries and 0 for civil law countries (La Porta et al., 2000). DISC is based on the disclosure index calculated by the Center for International Financial Analysis and Research. BIG4 is the market share of the Big 4 auditing companies in a country (Francis and Wang, 2008). The minimum (maximum) number of countries used in calculating the correlation coefficients is 23 (34). ***, **, and * indicate significant at 1%, 5%, and 10%, respectively.

need to control for this variable in our dividend payout regressions as previous evidence also suggests a significant role for legal system in dividend policy (e.g. La Porta et al., 2000)

4.4 Empirical Results

4.4.1 Dividend Payout and Earnings Quality: Descriptive Statistics

Figure 4.1 depicts the pattern of yearly dividend payout by banks in high earnings quality countries (HEQCs) versus banks in low earnings quality countries (LEQCs), so defined according their level of earnings management relative to the median level of earnings management. As shown in the figure, in general, for each year of the study, banks in HEQCs pay a higher proportion of their earnings, equity, revenue, cash flows, and assets in dividends than banks in LEQCs. This conclusion holds for both the mean and median dividend payout ratios, except in 1997 when the median dividend-to-earnings ratio is higher for banks in LEQCs than for banks in HEQCs.

Table 4.2 presents the descriptive statistics for the individual and aggregate earnings management measures and Table 4.3 presents the ranking of countries based on the level of earnings management by banks. Contrary to the ranking by Bhattacharya et al. (2003), our result shows that Hong Kong exhibits the least evidence of earnings management by banks followed by Singapore and Sweden. However, consistent with Bhattacharya et al. (2003), the table shows that Greece exhibits the highest evidence of earnings management. This result is also consistent with Francis and Wang (2008) who report that only 36% of the Greek firms use one of the Big 4 auditors, a percentage greater only to that of Philippines (25%) among the 42 countries that they study. While the overall ranking seems to be slightly at variance with that of Bhattacharya et al. (2003) for non-industrial firms, our ranking is consistent with the positive role of legal origin of banks in earnings quality. As reported in the table, 53% of countries with earnings management lower than the median earnings management (EQ=1) are common law countries while 47% are of civil law origin.

Table 4.2: Earnings Management Scores by Country and Legal Origin

Civil Law Countries:	Bank	Bank- Year	ABSLLP	MACC	SMOOTH	LOSS	AEM	EQ	RankAEM
GREECE	35	176	0.0067	0.7141	-0.7997	0.6364	27	0	29
AUSTRIA	346	2124	0.0044	0.7551	-0.7763	0.7429	26.75	0	28
TAIWAN	53	238	0.0067	0.8349	-0.6301	0.8286	26.25	0	27
GERMANY	2660	19470	0.0022	0.8571	-0.9372	0.6510	26.25	0	27
MEXICO	81	398	0.0088	0.8281	-0.7270	0.4545	25	0	26
JAPAN	941	6006	0.0047	0.8788	-0.5846	0.5938	22.5	0	25
BRAZIL	225	1326	0.0120	0.7177	-0.7523	0.0769	22.25	0	24
PORTUGAL	66	361	0.0045	0.6664	-0.6715	0.7037	21.5	0	23
INDONESIA	123	652	0.0070	0.6896	-0.5771	0.5652	20.5	0	22
FRANCE	521	3449	0.0005	0.7079	-0.8131	0.5556	20.5	0	22
SPAIN	270	1208	0.0036	0.5688	-0.7822	0.6818	20.25	0	21
SWITZERLAND	560	3420	0.0001	0.6667	-0.7655	0.8827	20	0	20
NORWAY	149	613	0.0034	0.5550	-0.7804	0.7143	19.25	0	19
KOREA (REP. OF)	89	395	0.0044	0.7738	-0.5602	0.4400	17.5	0	16
ITALY	927	2703	0.0041	0.7085	-0.6826	0.1489	17.25	1	15
NETHERLANDS	104	599	0.0013	0.5788	-0.7692	0.5000	15.5	1	10
TURKEY	79	357	0.0060	0.6937	-0.4205	-0.0909	13.25	1	8
DENMARK	130	1042	0.0032	0.5753	-0.6633	0.4444	13.25	1	8
CHILE	30	194	0.0070	0.5696	-0.5977	-1.0000	12.5	1	6
BELGIUM	133	827	0.0003	0.6053	-0.6077	0.5165	12	1	5
FINLAND	25	130	0.0006	0.5683	-0.7646	-0.1111	9.25	1	4
SWEDEN	138	801	0.0002	0.5556	-0.5557	0.5385	8.75	1	3
Civil Law Mean	7685	46849	0.0042	0.6850	-0.6917	0.4306	18.97		
Civil Law Median	7685	46849	0.0043	0.6917	-0.7048	0.5470	20.13		

Table 4.2 continues next page

Table 4.2 continued

Common Law Countries:	Bank	Bank-Year	ABSLLP	MACC	SMOOTH	LOSS	AEM	EQ	RankAEM
THAILAND	53	238	0.0069	0.7043	-0.3988	0.6667	20.25	0	21
SOUTH AFRICA	94	413	0.0075	0.6420	-0.7653	-0.6000	18.25	0	18
INDIA	95	649	0.0079	0.5692	-0.4494	0.6571	17.75	0	17
AUSTRALIA	105	516	0.0017	0.6531	-0.8440	0.2857	17	1	14
MALAYSIA	93	580	0.0071	0.5818	-0.5446	0.4545	16.25	1	13
IRELAND	69	379	0.0018	0.4433	-0.7813	0.6000	16	1	12
PAKISTAN	43	238	0.0058	0.6547	-0.4593	0.4667	15.75	1	11
UNITED KINGDOM	435	2794	0.0037	0.6190	-0.7075	0.3523	15.5	1	10
CANADA	118	689	0.0019	0.7017	-0.6511	0.3220	14.75	1	9
USA	12725	89300	0.0015	0.6132	-0.6817	0.4160	13	1	7
SINGAPORE	76	291	0.0046	0.5359	-0.2274	0.1892	8.25	1	2
HONG KONG	114	592	0.0009	0.4659	-0.5091	0.1064	5	1	1
Common Law Mean	14020	96679	0.0043	0.5987	-0.5850	0.3264	14.81		
Common Law Median	14020	96679	0.0041	0.6161	-0.5979	0.3842	15.88		
Test of Means (t-statistic)									
Civil vs. Common			-0.09	2.45**	-2.08**	0.73	2.21**		
Test of Medians (z-statistic)									
Civil vs. Common			0.50	2.05**	-1.66*	1.46	2.09**		
Global Summary:									
Mean			-0.0109	0.7338	-0.7138	0.4319	17.5		
Median			0.0041	0.6605	-0.6821	0.4833	17.38		
Standard Deviation			0.0815	0.3690	0.3056	0.4004	5.53		
Minimum			-0.5045	0.4433	-2.0755	-1.0000	5		
Maximum			0.0120	2.4521	-0.2274	1.4596	27		

The table presents the descriptive statistics for county-specific earnings management measures. LOSS is the number of banks with small positive earnings minus the number banks with small negative earnings divided by the sum of the two. Small positive earnings is defined as earnings after tax normalised by total assets in the range [0.000, 0.002] and small negative earnings is defined as earnings after tax normalised by total assets in the range of [-0.002, 0.000]. ABSLLP measures the magnitude of discretionary accruals and is the country median of the absolute value of error terms from the non-discretionary loan loss provisions model (Equation 4.3.8). MACC is the country median of the magnitude of total accruals - obtained from the Yasuda' et al's (2004) bank-specific accrual model. SMOOTH measures income smoothing and is the Spearman correlation coefficient between change in accruals and change in operating cash flows, where the value of accruals is derived from the Yasuda et al.'s (2004) model and operating cash flows is the difference between operating income and accruals. We calculate the SMOOTH variable over the pooled sample data for each country. AEM is the aggregate earnings management score - the average of the ranks of LOSS, ABSLLP, MACC and SMOOTH for each country. Higher values of ABSLLP, MACC, LOSS, AEM, and lower values of SMOOTH imply higher earnings management and lower earnings quality. EQ (earnings quality) takes the value of 1 if a country's aggregate earnings management (AEM) is less than the median AEM, otherwise 0. RankAEM is the country rank on AEM. Data to construct all variables are from BankScope (1996-2006). ** and * indicate significant at 5%, and 10%, respectively.

Table 4.3: Country Ranking on Earnings Management

ABSLLP	MACC	SMOOTH	LOSS	AEM
SWITZERLAND	IRELAND	SINGAPORE	CHILE	HONG KONG
SWEDEN	HONG KONG	THAILAND	SOUTH AFRICA	SINGAPORE
BELGIUM	SINGAPORE	TURKEY	FINLAND	SWEDEN
FRANCE	NORWAY	INDIA	TURKEY	FINLAND
FINLAND	SWEDEN	PAKISTAN	BRAZIL	BELGIUM
HONG KONG	FINLAND	HONG KONG	HONG KONG	CHILE
NETHERLANDS	SPAIN	MALAYSIA	ITALY	USA
USA	INDIA	SWEDEN	SINGAPORE	TURKEY
AUSTRALIA	CHILE	KOREA (REP. OF)	AUSTRALIA	DENMARK
IRELAND	DENMARK	INDONESIA	CANADA	CANADA
CANADA	NETHERLANDS	JAPAN	UNITED KINGDOM	NETHERLANDS
GERMANY	MALAYSIA	CHILE	USA	UNITED KINGDOM
DENMARK	BELGIUM	BELGIUM	KOREA (REP. OF)	PAKISTAN
NORWAY	USA	TAIWAN	DENMARK	IRELAND
SPAIN	UNITED KINGDOM	CANADA	MALAYSIA	MALAYSIA
UNITED KINGDOM	SOUTH AFRICA	DENMARK	MEXICO	AUSTRALIA
ITALY	AUSTRALIA	PORTUGAL	PAKISTAN	ITALY
KOREA (REP. OF)	PAKISTAN	USA	NETHERLANDS	KOREA (REP. OF)
AUSTRIA	PORTUGAL	ITALY	BELGIUM	INDIA
PORTUGAL	SWITZERLAND	UNITED KINGDOM	SWEDEN	SOUTH AFRICA
SINGAPORE	INDONESIA	MEXICO	FRANCE	NORWAY
JAPAN	TURKEY	BRAZIL	INDONESIA	SWITZERLAND
PAKISTAN	CANADA	FINLAND	JAPAN	SPAIN
TURKEY	THAILAND	SOUTH AFRICA	IRELAND	THAILAND
GREECE	FRANCE	SWITZERLAND	GREECE	FRANCE
TAIWAN	ITALY	NETHERLANDS	GERMANY	INDONESIA
THAILAND	GREECE	AUSTRIA	INDIA	PORTUGAL
CHILE	BRAZIL	NORWAY	THAILAND	BRAZIL
INDONESIA	AUSTRIA	IRELAND	SPAIN	JAPAN
MALAYSIA	KOREA (REP. OF)	SPAIN	PORTUGAL	MEXICO
SOUTH AFRICA	MEXICO	GREECE	NORWAY	TAIWAN
INDIA	TAIWAN	FRANCE	AUSTRIA	GERMANY
MEXICO	GERMANY	AUSTRALIA	TAIWAN	AUSTRIA
BRAZIL	JAPAN	GERMANY	SWITZERLAND	GREECE

The table presents the country ranks of individual earnings management and aggregate earnings management scores. The first (last) country in each ranking exhibits the best (worst) level of earnings management. LOSS is the loss avoidance variable; ABSLLP measures the magnitude of discretionary loan loss provisions; MACC is the magnitude of total accruals. SMOOTH is the measure of income smoothing. AEM is the aggregate earnings management score obtained by taking the average of the ranks of LOSS, ABSLLP, MACC and SMOOTH for each country. See Table 4.1 above for definitions of variables.

Table 4.2 also presents the tests of difference on mean and median earnings management variables between common and civil law countries. Our results show that the mean and median values of income smoothing (SMOOTH) and magnitude of accruals (MACC) are significantly lower in common law countries than in civil law countries. However, we find no significant difference on mean and median values of abnormal loan loss provisions (ABSLLP) and loss avoidance (LOSS) between these two groups of countries. Overall, the table shows that legal origin of countries significantly mitigates aggregate earnings management: we find positive and significant difference on mean and median aggregate earnings management scores between civil law and common law countries.

Table 4.4 presents some basic statistics on dividend payout for each country as well as the two groups of countries. This table speaks to the question concerning the role of earnings quality in bank dividend payout and, in addition to Figure 4.1, provides the first evidence supporting a positive relation between dividend payout and bank earnings quality. Consistent with the idea that banks in HEQCs pay larger dividends than banks in LEQCs, Table 4.4 shows that banks in HEQCs pay an average of about 50% of their earnings in dividends between 1996 and 2006 while banks in LEQCs pay an average of about 41% of their earnings in dividends during similar period. We replicate this higher payout ratio for banks in HEQCs for payout defined with respect to equity (DTE), bank revenue (DTR), cash flow (DTCF), and assets (DTTA). The tests of difference on means (medians) dividend payout between banks in HEQCs and LEQCs suggest that this difference is generally statistically significant across various definitions of dividend payout. For example, the t-statistic (z-statistic) on difference on means (medians) dividend-to-earnings ratio is 2.94 (2.67).[14] This result is consistent with the view that higher accounting quality permits greater monitoring and reduces agency problem (see, for example, Antle and Eppen, 1985; Biddle and Hilary, 2006). In the light of the potential double whammy of dividend taxation and dividend restricting regulations that banks face, one would ordinarily expect a relatively low dividend payout by banks. The high dividend payout ratios reported in the table for banks in both HEQCs and LEQCs suggest that bank dividend payout is an issue that deserves greater attention than it currently enjoys in theoretical and empirical literature.

[14] In unreported results we find similar evidence for difference on means and median using industry-adjusted dividend payout measures.

Table 4.4: Descriptive Statistics - Dividend Payout by Countries and Earnings Quality

Panel A: Low Earnings Quality Countries (LEQCs)

Country	EQ	DTE	DTR	DTCF	DTTA	DTEQ
AUSTRIA	0	0.3967	0.0681	0.1275	0.0029	0.0409
BRAZIL	0	0.4522	0.0737	0.1691	0.0146	0.0903
FRANCE	0	0.5036	0.1283	0.2299	0.0088	0.0785
GERMANY	0	0.4347	0.0190	0.0630	0.0010	0.0203
GREECE	0	0.4370	0.1112	0.2388	0.0046	0.0615
INDIA	0	0.2542	0.0573	0.1478	0.0037	0.0405
INDONESIA	0	0.4908	0.1023	0.2296	0.0117	0.0908
JAPAN	0	0.2928	0.0486	0.0363	0.0012	0.0122
KOREA (REP. OF)	0	0.3073	0.0782	0.1000	0.0033	0.0288
MALAYSIA	0	0.3898	0.0796	0.1150	0.0098	0.0571
MEXICO	0	0.4329	0.1148	0.2083	0.0063	0.0580
NORWAY	0	0.4065	0.0912	0.1976	0.0046	0.0634
PORTUGAL	0	0.3742	0.1414	0.1873	0.0106	0.0682
SOUTH AFRICA	0	0.3149	0.0536	0.1580	0.0026	0.0402
SPAIN	0	0.4997	0.2175	0.2661	0.0091	0.0596
SWITZERLAND	0	0.4365	0.2803	0.1957	0.0059	0.0280
TAIWAN	0	0.4869	0.3228	0.2378	0.0210	0.0658
Mean		0.4065	0.1169	0.1710	0.0072	0.0532
Median		0.4329	0.0912	0.1873	0.0059	0.0580

Table 4.4 continues next page

Table 4.4 continued

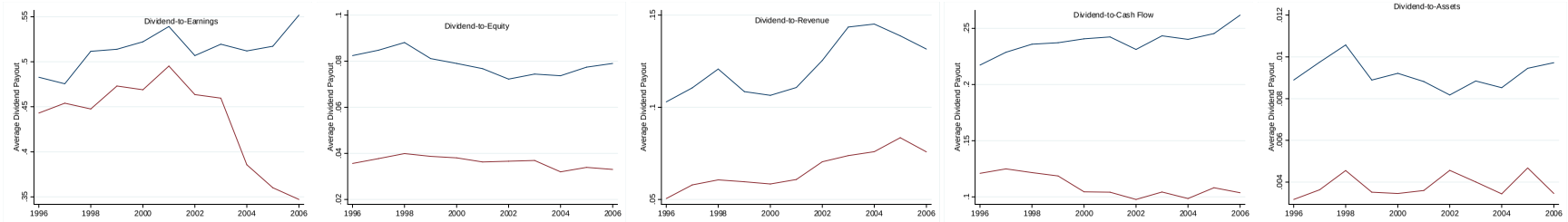
Panel B: High Earnings Quality Countries (HEQCs)

COUNTRY	EQ	DTE	DTR	DTCF	DTTA	DTEQ
AUSTRALIA	1	0.5629	0.1476	0.2529	0.0144	0.1444
BELGIUM	1	0.6025	0.1673	0.3293	0.0074	0.0798
CANADA	1	0.3875	0.0961	0.1516	0.0073	0.0621
CHILE	1	0.5149	0.0968	0.2464	0.0081	0.1038
DENMARK	1	0.3414	0.1045	0.1605	0.0076	0.0622
FINLAND	1	0.5182	0.2553	0.2905	0.0074	0.0743
HONG KONG	1	0.5907	0.2456	0.3627	0.0142	0.1061
IRELAND	1	0.6780	0.1472	0.403	0.0065	0.0870
ITALY	1	0.5573	0.1266	0.1942	0.0076	0.0622
MALAYSIA	1	0.3410	0.1235	0.1821	0.0062	0.0465
NETHERLANDS	1	0.4930	0.1630	0.2956	0.0054	0.0837
PAKISTAN	1	0.4514	0.2400	0.2446	0.0167	0.0881
SINGAPORE	1	0.4126	0.2719	0.2065	0.0192	0.0549
SWEDEN	1	0.5447	0.2337	0.3249	0.0157	0.1486
TURKEY	1	0.3377	0.0563	0.1795	0.0078	0.0592
UNITED KINGDOM	1	0.6200	0.2739	0.3129	0.024	0.1238
USA	1	0.5232	0.1228	0.2415	0.0087	0.0765
Mean		0.4986	0.1690	0.2576	0.0108	0.0861
Median		0.5182	0.1476	0.2464	0.0078	0.0798
Panel C: Test for Difference						
		Test of Means (t-statistic)				
HEQCs vs. LEQCs		2.94***	1.98**	3.61***	2.00**	3.55***
		Test of Medians (z-statistic)				
HEQCs vs. LEQCs		2.67***	2.38**	3.01***	1.98**	2.91***

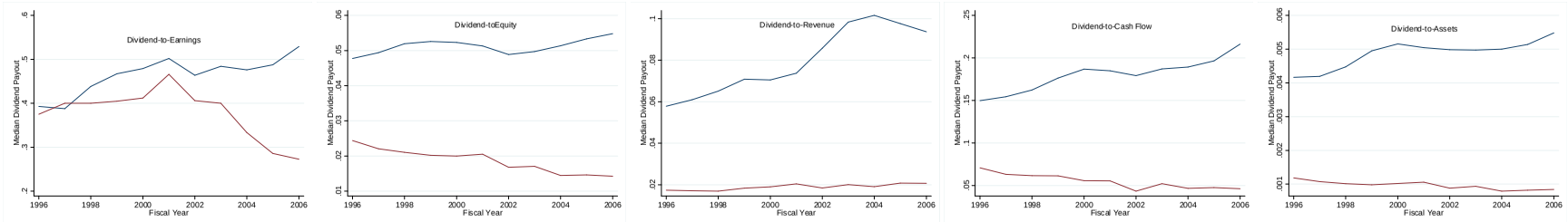
The table represents the descriptive statistics for dividend payout for 34 countries in our sample. Countries are classified according to their earnings quality status, where EQ is an earnings quality dummy variable that takes the value of 1 if the country's aggregate earnings management score is less than the median aggregate earnings management score, otherwise 0. DTE is the ratio of dividends to earnings; DTR is the ratio of dividends to bank revenue - the sum of interest and non-interest income; DTCR is the ratio of dividends to cash flows - operating income minus accruals. DTTA is the ratio of dividends to total assets. DTEQ is the ratio of dividends to common equity. All data used in measuring the variables are from BankScope and cover the period 1996 to 2006. Panel C presents the test of difference on mean (median) dividend payout between countries with high earnings quality (HECQs) and countries with low earnings quality (LECQs). *** and ** indicate significant at 1% and 5%, respectively.

Figure 4.1: Pattern of Yearly Dividend Payout by Earnings Quality Status

Panel A: Mean Dividend Payout



Panel B: Median Dividend Payout



The figure above shows the time trend in mean and median dividend payout for banks in 34 countries. The blue (red) lines show the trend for banks in high (low) earnings quality countries. Data are from BankScope for the period 1996-2006.

4.4.2 Regression Analysis

Table 4.5 presents estimates from the tests of H1 by regressing measures of bank dividend payout on aggregate earnings quality (AEQ) and other control variables proposed in the methodology section of this chapter. We estimate the models cross-sectionally using the average dividend payout for all banks in each country over the period of the study. One advantage of the cross-sectional regressions is that they give equal weights to countries included in the study, regardless of the number of banks in each country. This ensures that our results are not sensitive to the influence of a dominant country, such as the US that is disproportionately represented in the sample. Each panel of Table 4.5 presents the estimates of three regression specifications. In the first specification, we enter only the AEQ variable. In the second specification, we include two institutional variables - legal origin (LAW) and investor protection (PROTECT). In the third specification, we include the log of GDP per capita and average bank size (SIZE), two proxy variables for economic wide factors that may explain differences in bank dividend payout. The results presented in this table are consistent with our prediction of a positive relation between bank dividend payout and earnings quality. This positive relation holds even after controlling for the potential impact of institutional factors (LAW and PROTECT), as well as economic factors (LnGDP and SIZE). In addition, the results also suggest an economically significant relation between earnings quality and dividend payout.

Table 4.5 reports that AEQ explains between 12 percent and 37 percent of the cross-country variation in bank dividend payout. The coefficient on this variable is also positive and statistically significant at conventional level regardless of the definition of dividend payout adopted. With some marginal increases in R-square over the baseline model, the second and third model specifications also give some support to the economic significance of the included institutional and economic factors. However, unlike the AEQ variable, which continues to maintain its significance and correct sign, none of the institutional and economic factors is consistently statistically significant in our models. While this may be due to the lack of power due to the limited number of countries included in the regressions, these results are not surprising. For example, Biddle and Hilary (2006) find no role for legal origin and elements of investor protection on firm-level capital investment efficiency. In addition, Defond and Hung (2004) find that investor protection laws are not associated with improved CEO turnover-performance sensitivity, even though strong law enforcement institutions significantly improve the association between CEO turnover and poor performance. Bushman et al. (2004), who find no relation between legal origin of firms and financial transparency, reported similar results.

Table 4.5: Dividend Payout and Earnings Quality - Country-Level Regressions

AEQ	LAW	PROTECT	LnGDP	SIZE	Intercept	Adjusted R^2	N
Panel A: Dependent Variable - Dividend-to-Earnings (DTE)							
0.006***					0.557***	0.12	34
(3.09)					(13.24)		
0.005**	0.022	0.012*			0.431***	0.19	34
(2.33)	(0.53)	(1.80)			(5.39)		
0.005**	0.035	0.005	0.022	0.000**	0.268	0.24	34
(2.05)	(0.84)	(0.65)	(1.13)	(2.14)	(1.40)		
Panel B: Dependent Variable - Dividend-to-Revenue (DTR)							
0.006**					0.245***	0.19	34
(2.61)					(6.83)		
0.005*	0.045	0.001			0.300***	0.25	34
(1.89)	(1.56)	(0.22)			(3.15)		
0.006***	0.051*	-0.000	0.001	0.000***	0.211*	0.48	34
(3.63)	(1.79)	(-0.09)	(0.10)	(13.21)	(1.69)		
Panel C: Dependent Variable - Dividend-to-Cash-Flow (DTCF)							
0.008***					0.361***	0.37	34
(4.65)					(10.32)		
0.008***	0.023	0.004			0.304***	0.40	34
(4.26)	(0.92)	(1.03)			(5.85)		
0.008***	0.028	0.003	0.004	0.000***	0.278**	0.43	34
(4.35)	(0.98)	(0.58)	(0.39)	(3.79)	(2.44)		
Panel D: Dependent Variable - Dividend-to-Assets (DTTA)							
0.000**					0.015***	0.12	34
(2.45)					(6.00)		
0.000	0.005**	0.000			0.010*	0.29	34
(1.51)	(2.26)	(0.16)			(1.98)		
0.000*	0.004*	0.001	-0.001	0.000	0.020*	0.33	34
(1.78)	(1.75)	(1.09)	(-1.06)	(0.51)	(1.83)		
Panel E: Dependent Variable - Dividend-to-Equity (DTEQ)							
0.003***					0.115***	0.24	34
(3.20)					(7.25)		
0.002**	0.010	0.002			0.086***	0.28	34
(2.39)	(0.82)	(1.07)			(3.03)		
0.002**	0.007	0.004**	-0.005	-0.000*	0.121**	0.31	34
(2.25)	(0.49)	(2.65)	(-0.95)	(-1.83)	(2.13)		

This table reports the coefficients (above) and t-statistics (below) of the regression of dividend payout on aggregate earnings quality variable. DTE is the ratio of dividend to earnings; DTR is the ratio of dividend to bank revenue; DTCR is the ratio of dividend to cash flows; DTTA is the ratio of dividends to total assets; DTEQ is the ratio of dividend to common equity. AEQ is the aggregate earnings quality score. LAW is a dummy variable that takes the value of 1 for common law countries and the value of 0 for civil law countries. PROTECT is a measure of investor protection and is the sum of three variables from La Porta et al. (2000): rights of minority shareholders (antidirector), creditor rights, and legal enforcement. LnGDP is the log of gross domestic product per capita. SIZE is the average book value of total assets in the country over the study period. The reported t-statistics are based on standard errors adjusted for heteroscedasticity. ***, **, and * indicate significant at 1%, 5%, and 10%, respectively. N is the number of countries included in the regressions.

4.4.3 Additional Analysis

The regression results discussed so far support a positive relation between dividend payout and bank earnings quality. However, in reaching this conclusion, we have assumed that earnings quality is exogenous. One concern is that the relation may be endogenous, potentially biasing our results. In addition, our H1 suggests that causality runs from earnings quality to dividend payout but it could be that large (institutional) investors are attracted to banks with high dividend payout and these investors use their monitoring power to mitigate agency problems and extract higher earnings quality from banks. If this is true, then causality also runs from dividends to earnings quality resulting in a simultaneity problem. We provide further robustness checks of our primary result that address the endogeneity concern and consider additional control variables.

Table 4.6 presents the results of the estimations of our dividend-earnings quality regressions using bank-level observations and a two-stage least square (2SLS) procedure. While the two-least square (2SLS) procedure allows for endogeneity of earnings quality, we need to identify some exogenous parameters that affect only earnings quality but not bank dividend payout, except indirectly through other independent variables. However, it is difficult to construct instruments that both explain earnings quality but are unrelated to bank dividend payout. For this reason, we advocate caution in interpreting our results.

We use two country-level variables as instruments for earnings quality. However, as the relations among the institutional factors are difficult to model, again readers must exercise additional caution in interpreting our results. The first instrument that we use is the quality of accounting standards. We conjecture that better accounting standards should influence positively on earnings quality. We avoid the controversy surrounding the superiority or otherwise of national accounting standards, such as US GAAP, over international accounting standards (IAS/IFRS). We use the disclosure index from the Center for International Financial Analysis and Research (CIFAR). The disclosure index with values, potentially, between 0 and 100 captures the inclusion of 90 items as required disclosures in annual reports for each country. Higher scores are associated with greater required disclosure. Biddle and Hilary (2006) show that this variable is strongly and positively correlated with their country-specific measure of accounting quality, which in many respects is similar to the earnings quality variable that we use in this study. The correlation coefficient between this variable and our earnings quality variable is 0.43, significant at 5% (untabulated).

In addition, we also use a measure of the proportion of the market share of Big 4 auditing firms in each country as an instrument for earnings quality. We use this

measure for at least two reasons. First, an effective system of accounting and auditing that promotes better earnings quality is costly to maintain. While unobservable, we conjecture that the wealth of the nation devoted to ensuring better earnings quality should be positively associated with the market share of Big 4 firms. In addition, as Francis and Wang (2008) argue, Big 4 auditors are more likely to enforce higher earnings quality because they are more sensitive to cost implications of client's misreporting and the potential auditors' liability).[15] Our measure of market share of Big 4 firms (BIG4) is from Francis and Wang (2008). We have no reason to believe that this variable has a direct impact on dividend payout. As shown in Table 4.1, the correlation coefficient between this variable and our aggregate earnings management variable is -0.52, significant at 1% level of significant.

Table 4.6 and Table 4.7 present the results of additional analysis based on the discussion above. Each panel of the tables presents three regression specifications, estimated cross-sectionally using bank-level data. In the first specification, we enter only the AEQ variable. In the second specification, we include institutional and bank-level control variables. Specifically, we include additional bank-level variable (CAPR) that controls for capital adequacy. As banks with low capital to assets ratio may be constrained by regulatory authorities from paying dividends, we expect a positive relation between dividend payout and CAPR. We also include additional institutional variable (DTA) that controls for the differential treatment of dividend tax in various countries. The third regression specification uses the predicted value of AEQ from the first stage regression of AEQ on CAPR, BIG4, and other control variables. Thus, the specification is similar to second specification except for the AEQ variable. One advantage of estimating our model using bank-level observations is that it gives greater weight to countries with larger economies. For this reason, we do not include the GDP variable. The downside, however, is that our results may be driven by the inclusion of disproportionately large number of banks from a single country. To address this concern, Table 4.7 presents the estimated results excluding US sample banks.

The results reported in Table 4.6 and 4.7 support our primary finding that earnings quality is positively related to bank dividends, even after controlling for additional bank-level variables and accounting for the possibility that earnings quality is endogenous. In addition, this finding consistently holds, whether or not we include US banks in our

[15] However, these authors suggest that a strong investor protection may be required for this potential outcome to materialise. They note that without a strong investor protection, it is possible that auditors, in order maintain the patronage of their clients, may connive with managers in their earnings management behaviour (auditors conflict of interest).

regressions.

4.4.4 Earnings Quality and Dividend-Earnings Relation

In line with the second hypothesis (H2) of this chapter, we investigate the idea that dividend-earnings relation is stronger for banks in countries characterised by high earnings quality (HEQCs) compared to banks in countries with low earnings quality (LEQCs) - that is, earnings are more predictive of dividend changes for banks operating in high earnings quality countries.

Table 4.8 presents the results of the tests of this hypothesis using both Lintner (1956) and Fama-Babiak (1968) partial adjustment models, estimated for pooled sample of banks with consecutive dividends and earnings observations over the study period. We first estimate Equation 4.3.4 and Equation 4.3.6 using ordinary least squares. The untabulated results suggest that lagged dividend and current earnings (and lagged earnings) variables play a statistically significant role in bank dividend decision. Their signs are also as expected. However, results from such estimation procedure have two econometric weaknesses for panel data: they do not adjust for any possible dependence of firm-year observations within a group or for any possible autocorrelation across time, resulting in estimators that are biased and inconsistent (see, for example, Aivazian et al., 2006). To address this concern, all presented results relate to models that account for individual firm effect (firm fixed effect) and allow for constant autocorrelation across the individual firm observations.

Results in columns for Models 1-3 of Panel A of Table 4.8 show that the baseline Lintner model does a good job in explaining dividend change for the pooled sample of banks in all countries, for the subsample of banks in HEQCs and LEQCs, respectively. We draw similar conclusions from columns of Models 1-3 of Panel B, which present the estimates of the Fama and Babiak's modified partial adjustment model. The results reported in these columns are consistent with current and prior earnings levels being significant predictors of current dividend changes as demonstrated by Lintner (1956) and Fama and Babiak (1968). In addition, the significant negative coefficient on the lagged dividend variable indicates that banks follow a conservative dividend policy reflected in partial adjustment to the target payout ratio, consistent with Lintner's interpretation. Most importantly, consistent with H2, the absolute value of the 'speed of adjustment' (coefficient on lagged dividends) is greater for banks in HEQCs than for banks in LEQCs, suggesting that the changes in current earnings are more sustainable or managers more rapidly incorporate them into dividends (Foerster and Sapp, 2006).

Table 4.6: Dividend Payout and Earnings Quality - Bank-Level Regressions

AEQ/$\widehat{AEQ}$	LAW	PROTECT	ROE	SIZE	GROWTH	CAPR	DTA	Intercept	Adjusted R^2	N
Panel A: Dependent Variable - Dividend-to-Earnings (DTE)										
0.007***								0.599***	0.02	13478
(14.61)								(80.15)		
0.005***	0.018	0.032***	0.396***	-0.000	-0.508***	0.405***	0.205***	0.084	0.10	13478
(3.53)	(1.34)	(6.77)	(12.75)	(-0.52)	(-18.1)	(12.69)	(5.35)	(1.30)		
0.006***	0.024**	0.024***	0.400***	-0.000	-0.506***	0.394***	0.131***	0.229***	0.10	13478
(5.18)	(2.52)	(4.73)	(12.94)	(-0.87)	(-18.01)	(12.34)	(3.97)	(3.13)		
Panel B: Dependent Variable- Dividend-to-Revenue (DTR)										
0.006***								0.207***	0.03	13509
(24.16)								(52.89)		
0.003***	-0.042***	0.020***	0.618***	0.000***	-0.110***	1.202***	0.042	-0.218***	0.50	13509
(2.85)	(-4.74)	(7.10)	(31.59)	(2.99)	(-9.07)	(41.66)	(1.36)	(-6.32)		
0.006***	-0.050***	0.012***	0.617***	0.000*	-0.110***	1.189***	-0.002	-0.060*	0.50	13509
(6.69)	(-8.40)	(4.82)	(31.58)	(1.92)	(-9.10)	(41.45)	(-0.07)	(-1.73)		
Panel C: Dependent Variable- Dividend-to-Cash-Flow (DTCF)										
0.012***								0.394***	0.10	13283
(49.52)								(92.62)		
0.013***	-0.064***	0.007*	0.619***	0.000**	-0.295***	0.548***	0.003	0.280***	0.23	13283
(11.10)	(-6.11)	(1.88)	(26.43)	(2.35)	(-17.97)	(13.44)	(0.09)	(5.96)		
0.010***	-0.015*	-0.007**	0.635***	0.000**	-0.285***	0.545***	-0.167***	0.437***	0.22	13283
(7.87)	(-1.85)	(-2.02)	(27.25)	(2.20)	(-17.24)	(13.47)	(-5.86)	(8.41)		
Panel D: Dependent Variable- Dividend-to-Assets (DTTA)										
0.001***								0.018***	0.01	13546
(18.15)								(23.75)		
-0.000**	0.001	0.005***	0.084***	0.000***	-0.012***	0.022***	0.225***	-0.087***	0.29	13546
(-1.99)	(0.54)	(7.05)	(11.37)	(4.31)	(-3.32)	(3.09)	(10.35)	(-7.91)		
-0.000	-0.001	0.005***	0.084**	0.000***	-0.012***	0.026***	0.225***	-0.086***	0.29	13546
(-0.39)	(-1.33)	(7.12)	(11.30)	(4.10)	(-3.40)	(4.23)	(10.32)	(-7.67)		

Table 4.6 continues next page

Table 4.6 continued

Panel E: Dependent Variable - Dividend-to-Equity (DTEQ)										
0.004***								0.132***	0.05	13546
(43.06)								(71.13)		
0.003***	-0.004	0.010***	0.472***	0.000	-0.081***	0.225***	0.074***	-0.120***	0.28	13546
(5.09)	(-0.76)	(6.24)	(31.80)	(0.87)	(-10.58)	(9.71)	(4.21)	(-4.64)		
0.004***	-0.001	0.005***	0.473***	0.000	-0.081***	0.219***	0.035**	-0.027	0.29	13546
(6.95)	(-0.43)	(3.57)	(32.14)	(0.10)	(-10.52)	(9.41)	(2.49)	(-1.23)		

This table reports the coefficients (above) and t-statistics (below) of the regressions of dividend payout on aggregate earnings quality variable. AEQ is the aggregate earnings quality score. LAW is a dummy variable for the country's legal system and takes the value of 1 for common law countries and the value of 0 for civil law countries (La Porta et al., 1998). PROTECT is a measure of investor protection and is the sum of three variables from La Porta et al. (1998): rights of minority shareholders (antidirector), creditor rights, and legal enforcement. ROE is the ratio of net income to total equity. SIZE is the book value of total assets. GROWTH is the change in total equity. CAPR is the ratio of capital to total assets. DTA is the dividend tax advantage (La Porta et al., 2000). Firm-level variables are averages over the whole sample period. The reported t-statistics are based on standard errors adjusted for heteroscedasticity. N is the number of observations. ***, **, and * indicate significant at 1%, 5%, and 10%, respectively.

Table 4.7: Dividend Payout and Earnings Quality (Non-US Banks)

AEQ/$\widehat{AEQ}$	LAW	PROTECT	ROE	SIZE	GROWTH	CAPR	DTA	Intercept	Adj. R^2	N
Panel B: Dependent Variable - Dividend-to-Earnings (DTE)										
0.006***								0.575***	0.01	3643
(5.67)								(24.13)		
0.006***	0.038**	0.034***	0.116*	-0.000	-0.359***	0.336***	0.202***	0.104	0.09	3643
(4.06)	(2.13)	(6.91)	(1.92)	(-1.23)	(-8.56)	(6.53)	(4.60)	(1.56)		
0.009***	-0.001	0.020***	0.120**	-0.000	-0.352 ***	0.332***	0.192***	0.282***	0.09	3643
(5.99)	(-0.06)	(3.43)	(2.02)	(-1.11)	(-8.39)	(6.49)	(4.62)	(3.63)		
Panel B: Dependent Variable - Dividend-to-Revenue (DTR)										
0.014***								0.413***	0.10	3641
(16.55)								(19.40)		
0.003***	0.049***	0.030***	0.496***	-0.000	-0.036	1.172***	-0.111***	-0.172***	0.54	3641
(3.18)	(3.59)	(9.59)	(11.50)	(-0.48)	(-1.46)	(26.29)	(-3.56)	(-5.09)		
0.002**	0.051***	0.026***	0.509***	-0.000	-0.031	1.176***	-0.137***	-0.151***	0.53	3641
(2.13)	(3.68)	(8.28)	(11.64)	(-0.10)	(-1.25)	(26.56)	(-4.97)	(-3.91)		
Panel C: Dependent Variable - Dividend-to-Cash-Flow (DTCF)										
0.018***								0.539***	0.17	3444
(23.20)								(28.35)		
0.012***	0.023	0.020***	0.512***	0.000	-0.175***	0.670***	-0.110***	0.232***	0.32	3444
(10.46)	(1.44)	(5.11)	(11.36)	(1.11)	(-6.93)	(10.49)	(-2.87)	(5.02)		
0.007***	0.045**	0.007	0.568***	0.000**	-0.148***	0.700***	-0.222***	0.280***	0.29	3444
(5.03)	(2.58)	(1.61)	(12.47)	(2.25)	(-5.72)	(10.96)	(-6.41)	(5.03)		
Panel D: Dependent Variable - Dividend-to-Assets (DTTA)										
0.001***								0.035***	0.03	3676
(7.44)								(8.03)		
0.000*	0.008***	0.003***	0.041***	0.000	-0.013***	0.010*	0.120***	-0.041***	0.21	3676
(1.92)	(2.83)	(4.85)	(4.66)	(0.29)	(-3.02)	(1.80)	(5.54)	(-4.07)		
0.000**	0.007***	0.003***	0.042***	0.000	-0.013***	0.009*	0.120***	-0.036***	0.21	3676
(2.09)	(2.71)	(4.43)	(4.70)	(0.41)	(-2.93)	(1.68)	(5.56)	(-3.75)		

Table 4.7 continues next page

Table 4.7 continued

Panel E: Dependent Variable - Dividend-to-Equity (DTEQ)										
0.007***								0.200***	0.12	3676
(16.36)								(19.12)		
0.003***	0.040***	0.012***	0.364***	-0.000**	-0.053***	-0.001	0.092***	-0.034	0.27	3676
(6.90)	(4.99)	(6.59)	(13.07)	(-2.01)	(-4.01)	(-0.06)	(3.58)	(-1.52)		
0.003***	0.040***	0.007***	0.376***	-0.000	-0.048***	-0.024*	0.010***	0.002	0.27	3676
(5.42)	(4.65)	(3.81)	(13.43)	(-1.37)	(-3.62)	(-1.79)	(3.75)	(0.09)		

This table reports the coefficients (above) and t-statistics (below) of the regressions of dividend payout on aggregate earnings quality variable. AEQ is the aggregate earnings quality score. LAW is a dummy variable for the country's legal system and takes the value of 1 for common law countries and the value of 0 for civil law countries. PROTECT is a measure of investor protection and is the sum of three variables from La Porta et al. (1998): rights of minority shareholders (antidirector), creditor rights, and legal enforcement. ROE is the ratio of net income to total equity. SIZE is the book value of total assets. GROWTH is the change in total equity. CAPR is the ratio of capital to total assets. DTA is the dividend tax advantage (La Porta et al., 2000). Firm-level variables are averages over the whole sample period. N is the number of observations. The reported t-statistics are based on standard errors adjusted for heteroscedasticity. ***, **, and * indicate significant at 1%, 5%, and 10%, respectively.

In general, the table also projects an interesting result supporting the overall theme of this chapter as expressed in H1: banks in HEQCs pay larger dividends than banks in LEQCs. For example, while the implied payout ratio for the sample of all banks during the period of the study represents 48% of earnings using the Lintner model (column of Model 1), the implied payout ratio for banks in HEQCs represents 53% of earnings as against 31% for LEQCs.[16] Thus, while the actual mean dividends to earnings ratio of 50% (see, Table 4.4, above) by banks in HEQCs is closer to the implied dividend payout suggested by the Lintner model, the actual mean dividend payout of 40% for LEQCs (see, Table 4.4, above) exhibits greater deviation from the implied dividend payout (see, Table 4.4, above). This result suggests that in addition to banks in HEQCs paying larger dividends than banks in LEQCs, as predicted by H1, their dividend payout ratio also exhibits greater conformity with the optimal payout ratio implied by the Lintner model.

Interestingly, we note that while the 'speed of adjustment' for banks seems to be substantially higher than those for previous studies, the implied payout ratio reported by our study is consistent with the payout ratio of 50% reported by Lintner (1956). It is also within the range (40%-82%) reported by Fama and Babiak (1968) but greater than the upper limit of 35% reported by Brav et al. (2005).[17] However, these studies are restricted to the US. This result is consistent with the anecdotal evidence that banks follow a more aggressive dividend policy and pay high proportion of their earnings in dividends. Finally, with adjusted R-squares ranging between 14% and 27% for each of the baseline models in Table 4.8, we have cumulative evidence to believe that the Lintner and Fama-Babiak models perform fairly well in explaining the variability of bank dividends and thus suitable for our purpose.

Columns of Models 4-8 of Panel A and Panel B of Table 4.8 report the results of the estimation of the modified Lintner (1956) and Fama and Babiak (1968) models that incorporate an interaction variable (lagged DPS$\times$EQ), which tests the difference in the 'speed of adjustment' of dividends to the "target payout" ratio. Column of Model 4 is equivalent to the estimated separate regression Models 2 and 3, but pools the observations to maximise the power of the tests and forcing a common intercept. An unstated null hypothesis is that the dividend-earnings-quality indicator variable for HEQCs is insignificant and that banks in these countries smooth their dividends to the same

[16] We "back-out" the implied payout ratio, using the negative of ratio of the coefficient on earnings variable to the coefficient on the lagged dividend variable (e.g. Fama and Babiak, 1968). For example, with coefficients of 0.243 on earnings and -0.459 on lagged dividend variable for banks in HEQCs, we can back-out the implied payout ratio of 53% reported above.

[17] See Andres et al. (2009) for a summary of estimates from various studies.

degree as banks in LEQCs. If this is true, the coefficient on the interaction variable should be insignificantly different from zero. The significant negative loading on this variable shown in the table suggests that the coefficient is more negative for HEQCs versus LEQCs consistent with the idea that changes in current earnings are more sustainable or managers more rapidly incorporate them into dividends. More sustainable earnings are usually associated with higher earnings quality. As reported in column of Model 2 and 3, it will take almost double the number of years it takes banks in HEQCs for banks in LEQCs to adjust their dividends to the target payout ratio. This result extends the findings by Aivazian et al. (2006), Leary and Michaely (2011) and Michaely and Robert (2011) on the determinants of dividend smoothing by firms. While these authors find support for the role of capital markets, corporate governance, and institutional holdings on dividend smoothing, our study suggests that, at least for banks, the propensity to smooth dividend depends on earnings quality. As reported in column of Model 4, the interaction term is highly significant at -0.198 and the coefficient on the lagged dividends drops from -0.434 in Model 1 to -0.273 in Model 4. Overall, the results in columns for Models 2-4 indicate that banks in both HEQCs and LEQCs smooth their dividends. However, this evidence also suggests that banks in LEQCs do not quickly adjust their dividends to the target payout ratio (they engage in greater dividend smoothing).

Most relevant to H2, columns of Models 4-8 of Panel A and Panel B of Table 4.8 also include either or both the interaction variables (lagged EPS$\times$EQ and EPS$\times$ EQ) that test whether the dividend-earnings relation is significantly different for banks in HEQCs versus banks in LEQCs. The results show that the dividend-earnings link is significantly different for banks in the two groups of countries - the coefficients of the interaction term between current earnings and earnings quality are positive and highly significant, whatever the model of dividends that we use. The generally positive and significant interaction term of current earnings with earnings quality in columns of Model 4 suggests that banks operating in HEQCs are more likely to increase (reduce) their dividends following an increase (decrease) in current earnings. This result is consistent with current earnings in HEQCs being a better a predictor of dividend policy (change) than current earnings in LEQCs. Specifically, banks in HEQCs adjust their dividends more quickly in response to increases earnings.

We further divide our sample according to the direction of dividend and earnings changes as dividend increases are a less likely option for banks with reducing earnings. As presented in columns of Model 5-8, our findings of a stronger dividend-earnings link and faster 'speed of adjustment' for banks in HEQCs remains unchanged even for these

subsamples. However, contrary to expectation, we find no consistent evidence of a stronger significant positive link between dividends and lagged earnings for banks operating in HEQCs relative to banks operating in LEQCs. For example, for the full sample reported in Column of Model 4, the coefficient on the interaction term between lagged earnings and earnings quality (lagged EPS$\times$EQ) is significantly lower at -0.020 for banks in HEQCs compared to banks in LEQCs. This, however, is significantly positive at 0.029 for the subsample of banks with earnings increases.

How robust are our results? As a robustness check of our results we re-estimate Equation 4.3.4 and Equation 4.3.6 using a data set that excludes US banks. As presented in Table 4.9 our results are generally consistent with those reported under the full sample. Thus, the disproportionate representation of US banks in the full sample does not drive the results. In addition, we also estimate a model consisting of country effect and year dummies (untabulated). Our conclusions are generally consistent with the idea of a stronger dividend-earnings link in HEQCs than in LEQCs, at least for the current earnings variable.

Table 4.8: Earnings Quality and Dividend-Earnings Relation

		Basic Model			High Earnings Quality vs Low Earnings Quality				
Model		1	2	3	4	5	6	7	8
		All	HEQCs	LEQCs	All	Increase in EPS	Decrease in EPS	Increase in DPS	Decrease in DPS
lagged DPS	-	-0.434***	-0.459***	-0.272***	-0.273***	-0.151***	-0.407***	0.203***	-0.503***
		(-165.21)	(-165.12)	(-29.03)	(-29.12)	(-9.85)	(-38.81)	(12.72)	(-72.12)
EPS	+	0.208***	0.243***	0.085***	0.065***	0.157***	0.016***	0.110***	0.042***
		(108.63)	(103.29)	(26.37)	(20.55)	(22.11)	(5.00)	(18.62)	(11.53)
EQ	?				-0.007***	-0.006***	-0.003***	0.008***	-0.012***
					(-17.33)	(-8.03)	(-6.34)	(9.95)	(-27.64)
lagged DPS×EQ	-				-0.198***	-0.256***	-0.097***	-0.285***	-0.075***
					(-19.94)	(-15.80)	(-8.66)	(-16.35)	(-9.86)
EPS×EQ	+				0.206***	0.170***	0.175***	0.127***	0.185***
					(48.29)	(20.16)	(35.81)	(15.52)	(38.15)
Intercept	+	0.002***	-0.001*	0.003***	0.004**	-0.004***	0.006***	0.001**	0.004***
		(7.75)	(-1.84)	(10.13)	(14.48)	(-8.57)	(20.72)	(2.24)	(15.09)
Adjusted R^2		0.25	0.27	0.14	0.27	0.19	0.38	0.11	0.67
N		92206	77578	14628	92206	45701	46313	34112	36628

Table 4.8 continues next page

Table 4.8 Continued

Panel B: Fama-Babiak Model

		Basic Model			High Earnings Quality vs. Low Earnings Quality				
		1	2	3	4	5	6	7	8
		All	High	Low	All	Increase in EPS	Decrease in EPS	Increase in DPS	Decrease in DPS
lagged DPS	-	-0.443***	-0.462***	-0.281***	-0.285***	-0.144***	-0.457***	0.181***	-0.509***
		(-159.75)	(-157.90)	(-28.47)	(-28.89)	(-9.23)	(-39.90)	(10.80)	(-68.05)
EPS	+	0.193***	0.237***	0.081***	0.060***	0.175***	-0.007*	0.096***	0.041***
		(81.44)	(75.26)	(24.43)	(18.22)	(22.52)	(-1.81)	(15.37)	(10.49)
lagged EPS	+	0.027***	0.010***	0.012***	0.016***	-0.023***	0.071***	0.036***	0.008**
		(10.77)	(3.18)	(3.43)	(4.56)	(-4.81)	(10.52)	(4.88)	(2.34)
EQ	?				-0.006***	-0.005***	-0.002***	0.012***	-0.014***
					(-15.76)	(-6.57)	(-3.25)	(13.61)	(-30.95)
lagged DPS× EQ	-				-0.186***	-0.264***	-0.059***	-0.237***	-0.084***
					(-17.70)	(-16.05)	(-4.87)	(-12.94)	(-10.37)
EPS×EQ	+				0.214***	0.148***	0.158***	0.191***	0.141***
					(42.30)	(13.93)	(23.26)	(19.73)	(24.38)
lagged EPS×EQ	+				-0.020***	0.029***	-0.013	-0.122***	0.062***
					(-3.77)	(3.53)	(-1.45)	(-11.08)	(11.07)
Intercept	+	0.001***	-0.001**	0.002***	0.004***	-0.005***	0.003***	0.000	0.004***
		(4.51)	(-2.55)	(8.98)	(12.99)	(-9.84)	(6.98)	(0.59)	(14.14)
Adjusted R^2		0.25	0.27	0.14	0.27	0.19	0.38	0.12	0.68
N		92187	77569	14618	92187	45682	46313	34107	36626

This table reports the coefficients (above) and t-statistics (below) of the specified partial adjustment models: Panel A presents estimates of the modified Lintner (1956) model while Panel B presents estimates of the modified Fama and Babiak (1968) model. The change in dividend variable is regressed against the lagged dividend and earnings variable with and without the interaction variables constructed as the earnings quality indicator variable (EQ) times the lagged dividend variable and earnings variable(s). EQ (earnings quality) takes the value of 1 if a country's aggregate earnings management (AEM) is less than the median AEM, otherwise 0. A country is classified as high earnings quality country (HEQC) and assigned a value of 1 if its aggregate earnings management measure is lower than median aggregate quality measure for all countries; otherwise the country is classified as LEQC and assigned a value of 0. N is the number of observations. The reported statistics are based on standard errors that have been corrected for country-specific heteroscedasticity and country-specific autocorrelation. ***, **, and * indicate significant at 1%, 5%, and 10% respectively.

Table 4.9: Dividend-Earnings Relation and Earnings Quality (Non-US Banks)

Panel A: Lintner Model

		Basic Model			High Earnings Quality vs. Low Earnings Quality				
		1	2	3	4	5	6	7	8
		All	High	Low	All	Increase in EPS	Decrease in EPS	Increase in DPS	Decrease in DPS
lagged DPS	-	-0.352***	-0.495***	-0.272***	-0.273***	-0.123***	-0.405***	0.193***	-0.497***
		(-43.19)	(-34.05)	(-29.03)	(-29.19)	(-7.96)	(-38.82)	(12.09)	(-71.27)
EPS	+	0.120***	0.215***	0.085***	0.085***	0.147***	0.039***	0.110***	0.056***
		(35.88)	(19.80)	(26.37)	(26.27)	(20.29)	(11.80)	(18.44)	(15.38)
EQ	?				0.002	-0.004	0.007***	0.014***	-0.003*
					(1.07)	(-1.34)	(3.46)	(4.33)	(-1.74)
lagged DPS×EQ	-				-0.231***	-0.242***	-0.154***	-0.174***	-0.105***
					(-12.98)	(-7.90)	(-7.48)	(-4.71)	(-8.19)
EPS× EQ	+				0.150***	0.154***	0.103***	0.080***	0.071***
					(11.82)	(6.90)	(6.33)	(3.40)	(6.33)
Intercept	+	0.004***	0.007***	0.003***	0.003***	-0.004***	0.005***	0.002***	0.003***
		(12.75)	(3.98)	(10.13)	(10.30)	(-8.33)	(18.36)	(2.94)	(10.92)
Adjusted R^2		0.19	0.29	0.14	0.22	0.14	0.42	0.23	0.73
N		17944	3316	14628	17944	8493	9275	6668	8011

Table 4.9 continues next page

Table 4.9 Continued

Panel B: Fama-Babiak Model

		Basic Model			High Earnings Quality vs. Low Earnings Quality				
		1	2	3	4	5	6	7	8
		All	High	Low	All	Increase in EPS	Decrease in EPS	Increase in DPS	Decrease in DPS
lagged DPS	-	-0.365***	-0.491***	-0.281***	-0.284***	-0.125***	-0.441***	0.176***	-0.496***
		(-41.99)	(-31.6)	(-28.47)	(-28.75)	(-7.98)	(-38.39)	(10.45)	(-66.32)
EPS	+	0.113***	0.220***	0.081***	0.080***	0.151***	0.020***	0.010***	0.057***
		(32.14)	(17.39)	(24.4)	(24.08)	(19.14)	(5.24)	(15.90)	(14.44)
lagged EPS	+	0.020***	-0.012	0.012***	0.014***	-0.001	0.053***	0.027***	-0.001
		(5.07)	(-0.83)	(3.42)	(3.96)	(-0.22)	(7.69)	(3.70)	(-0.26)
EQ	?				0.003*	-0.004	0.008***	0.017***	-0.005***
					(1.80)	(-1.19)	(3.02)	(4.99)	(-2.98)
lagged DPS×EQ	-				-0.210***	-0.241***	-0.124***	-0.126***	-0.119***
					(-11.15)	(-7.63)	(-5.68)	(-3.25)	(-8.66)
EPS× EQ	+				0.170***	0.149***	0.108***	0.116***	0.049***
					(11.18)	(5.08)	(4.83)	(4.38)	(3.57)
lagged EPS×EQ	+				-0.045***	-0.000	-0.030	-0.090***	0.049***
					(-2.75)	(-0.01)	(-1.20)	(-3.12)	(3.31)
Intercept	+	0.003***	0.007***	0.002***	0.002***	-0.005***	0.003***	0.001	0.003***
		(10.98)	(4.04)	(8.98)	(9.00)	(-8.43)	(7.11)	(1.57)	(11.11)
Adjusted R^2		0.19	0.29	0.14	0.22	0.14	0.42	0.23	0.73
N		17927	3309	14618	17927	8476	9275	6663	8009

This table reports the coefficients (above) and t-statistics (below) of the regression of change in dividends on lagged dividends and current earnings (and lagged earnings-Panel B): Panel A presents estimates of the Lintner (1956) model while Panel B presents estimates of the Fama and Babiak (1968) model. The change in dividend variable is regressed against the lagged dividend and earnings variable with and without the interaction variables constructed as the earnings quality indicator variable (EQ) times the lagged dividend variable and earnings variable(s). EQ (earnings quality) takes the value of 1 if a country's aggregate earnings management (AEM) is less than the median AEM, otherwise 0. A country is classified as high earnings quality country (HEQC) and assigned a value of 1 if its aggregate earnings management measure is lower than median aggregate quality measure for all countries; otherwise the country is classified as LEQC and assigned a value of 0. N is the number of observations. The reported statistics are based on standard errors that have been corrected for country-specific heteroscedasticity and country-specific autocorrelation. ***, **, and * indicate significant at 1%, 5%, and 10% respectively.

4.5 Conclusion

This chapter presents the results of the study investigating the relation between bank dividend policy and earnings quality. We construct an aggregate measure of country-specific bank earnings quality that incorporates different dimensions of earnings management - loss avoidance, earnings smoothing, and magnitude of accruals. We document that this measure exhibits consistent and correctly signed correlations with measures of transparency and opacity that exist in the literature. Using the index of bank earnings quality, we then investigate whether banks in countries with high earnings quality pay higher dividends than banks in countries with low earnings quality. Our evidence suggests that this is the case: we document a link between earnings quality and the proportion of earnings, revenue, equity, cash flows, and assets paid in dividends by banks around the world. This result is consistent with the stylised findings of the reluctance by managers to reduce dividends, the known conservatism towards dividend increases, and the costly nature of dividends.

Even though we attempt to mitigate the potential measurement error by using the aggregate earnings quality measure, the link between dividend payout and earnings quality may still be spurious given the potential endogeneity of earnings quality and the difficulty in modelling the relationship among institutional factors. We address this endogeneity concern using a two-stage least square (2SLS) regression. We use quality of accounting standards and the market share of Big 4 auditing firms as instruments for earnings quality. Our primary result of a positive relation between dividends and earnings quality continues to hold, even after controlling for a number of institutional variables and bank-specific factors, and accounting for the endogeneity of earnings quality.

We extend the study and investigate the possibility of a differential dividend-earnings link between banks in high earnings quality countries and banks in countries with low earnings quality. If earnings quality plays a role in bank dividend policy, we conjecture that this role should reflect in the relation between banks earnings and dividends. Using different specifications of the partial adjustment model, we find consistent evidence suggesting that banks around the world follow a dividend smoothing policy in which managers gradually adjust dividends to meet target earnings. Most importantly, our results show that earnings quality moderates the relation between dividends and earnings. We show that current earnings (lagged dividends) of banks in countries with high earnings quality are more positively (negatively) related to dividends than current earnings (lagged dividends) of banks in countries with low earnings quality. This result is consistent with the idea that earnings of banks in countries with high earnings quality are more sustain-

able than earnings of banks in countries with low earnings quality, and that managers are quicker in incorporating them into dividends. We conclude that earnings of banks in high earnings quality countries are better predictors of dividends. However, contrary to expectation, we find that lagged earnings of banks in countries with high earnings quality have a weaker link with dividends than lagged earnings of banks in countries with low earnings quality. In all cases, we find that our results are robust to the disproportionate representation of US banks in the sample.

Notwithstanding the limitations of the study, as discussed above, our study highlights findings that have important implications for investors, policy-makers, bank regulators, and academics. Consistent with the suggestion in some quarters for the use of dividends as certification of earnings quality, our finding establishing a positive relation between dividend payout and earnings quality suggests that there may be some information in dividends that is related to bank earnings quality. Thus, while dividend payout has implications for capital adequacy requirement of banks for which retention of earnings may sometimes be preferred, our results suggest that disgorging dividends may proxy not only for the adequacy of bank capital, the level of its earnings, but also the quality of these earnings. Perhaps, a policy of compulsory dividend payment mooted in some quarters is one way of confirming the quality of bank earnings and distinguishing between "good" banks (with high earnings quality) and "bad" banks (with low earnings quality).

5 Conclusion

This thesis draws on theoretical and empirical studies in the fields of finance and accounting on dividends and market pricing of information risk to investigate broad issues relating to banks. Specifically, relying on the agency-based theory of dividends, our first study investigates the relation between bank dividends and bank efficiency. Unlike other studies in the literature, we operationalise bank agency problem using efficiency scores, obtained from data envelopment analysis (DEA). We present the results of this study in Chapter 2 of the thesis. Chapter 3 presents the results of the second study that examines a number of market consequences of bank earnings quality. Finally, the third study develops an index of country-specific bank earnings management that forms the basis of the investigation of the relation between bank earnings quality and dividend payout in 34 countries around the world. Chapter 4 of this thesis presents the results of the study. This chapter presents the main conclusions of the thesis.

5.1 Main Conclusions

In line with previous studies, our study confirms a positive relation between the direction of dividends change and market reactions to dividends. We find that markets react positively (negatively) to dividend increases (decreases). This primary result supports the idea that markets seem to update expectations about bank performance from dividends news. However, the market reactions following dividend change announcements by banks is substantially lower than those documented in extant literature for industrial firms, suggesting that the role of dividends in resolving information asymmetry between banks and investors seems attenuated by regulations. While our study fails to rule out competing explanations for the positive market reactions to announcements of dividend increases, it establishes a link between market reactions to announcements of dividend increases and changes in bank efficiency, our measure of bank agency problem obtained from a frontier analysis of bank input-output combinations.

We provide evidence of a negative relation between bank earnings quality, measured as an aggregate of four accounting based earnings quality attributes, and the cost of

equity. Further extension of the study uncovers strong evidence of a positive relation between market valuation of bank stocks and earnings quality. Consistent with these two findings, we also find stronger positive price-earnings multiples for banks with high earnings quality relative to banks with low earnings quality. Overall, our results suggest that markets seem to pay a premium not only for the level of earnings but also for the quality of these earnings. These results support the argument often presented by regulatory authorities, various accounting standards boards, and the Basle Committee on banking regulation that better accounting that results in greater disclosure level and greater quality of financial reporting is associated with significant reduction in the cost of equity. Thus, while better accounting may be associated with unintended operating costs that affect the bottom line, the higher earnings quality resulting from better accounting also reduces bank cost of equity.

However, our results also point to the fact that the relation between cost of equity and individual attributes of bank earnings is not unidirectional as individual elements of our aggregate measure exhibit significant but incorrectly signed and, in some cases, insignificant relation with bank cost of equity and bank valuation. This evidence suggests that while earnings quality is an important factor in bank cost of equity, the dimension of earnings matters. The result also supports the claim by some practitioners that greater information results in more price volatility and higher cost of equity. Notwithstanding this finding, the balance of evidence presented in this thesis supports a positive role for earnings quality, as it permits better monitoring that reduces information asymmetry and information risk. In all, these results speak directly to the efforts by regulatory authorities to incorporate market discipline in bank regulation: markets can differentiate between "good" and "bad" earnings and will reward banks with high earnings quality. In addition, it also has important implications for the estimation of bank cost of equity.

The implication of bank earnings quality is not limited to the reduction in the cost of equity or the associated positive pricing of bank stocks. In a related study that draws evidence from 34 countries around the world, we find that banks in countries with high earnings quality, measured as a composite of loss avoidance, earnings smoothing, and magnitude of accruals, pay a higher proportion of their earnings, revenue, equity, cash flows, and assets in dividends. Banks in these countries also engage in less dividend smoothing and have stronger dividend-earnings relation, consistent with the idea that bank earnings in these countries are more sustainable. These results along with those discussed above give support to the idea that better bank earnings quality is a valuable corporate governance tool that permits better monitoring of banks and give support to

the argument that dividends are credible certification of earnings quality (e.g. Breeden, 2003).

In line with the results presented in this thesis, we advocate that an additional "E" element be included in the bank rating system. Specifically, we advocate a CAMEELS rating system, the second E being earnings quality. While the level of earnings is important, in view of the fact that these earnings are subject to manipulation by bank management, our results advise that regulatory and supervisory authorities should design and institutionalise measures aimed at assessing the quality of bank earnings. Perhaps, a mandatory payment of dividends often advocated as a certification of earnings is an idea worth revisiting.

5.2 Limitations and Suggestions for Future Research

Our study provides opportunities for further studies on the market and non-market consequences and determinants of bank earnings quality. Our index of country-specific bank earnings quality provides opportunities to investigate such issues as the role of bank regulations on bank earnings quality. While studies have attempted to link variation in regulations across countries to bank valuation, we are not aware of any study that examines whether such variations affect bank earnings quality. It will be interesting to know whether the index of earnings quality constructed in this thesis is able to predict the performance of banks in different countries during or after the crisis.

However, our study is not without its limitations. First, while we take the best possible approach to mitigate measurement errors, we cannot completely rule out this problem. For a fact, we constructed our measures of earnings quality from limited time series data when compared to that available for similar studies on industrial firms. Even though the validation of our aggregate earnings quality measure suggests that the measure correlates in the expected direction with some country-specific measures of transparency and opacity, we believe that the data limitation in many of the countries that we study is an important issue that may tweak our findings. In addition, we only consider limited dimensions of earnings quality in this thesis. For example, none of our studies considers the implications of market-based earnings quality measures on the outcomes examined in this thesis. Given the multi-dimensional nature of earnings quality and the established evidence that different earnings quality attributes exhibit different outcomes, it would be interesting to uncover what role, if any, other earnings attributes play in bank equity.

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