Effect of mandatory interim reporting frequency on the cost of capital around the world

Fu, Ren Hui

2010

Fu, R. H. (2010). Effect of mandatory interim reporting frequency on the cost of capital around the world. Doctoral thesis, Nanyang Technological University, Singapore.

<https://hdl.handle.net/10356/40150>

<https://doi.org/10.32657/10356/40150>

**NANYANG
TECHNOLOGICAL
UNIVERSITY**

**THE EFFECT OF MANDATORY INTERIM REPORTING
FREQUENCY ON THE COST OF CAPITAL AROUND THE
WORLD**

FU RENHUI

**FU RENHUI
NANYANG BUSINESS SCHOOL
2010**

THE EFFECT OF MANDATORY INTERIM REPORTING FREQUENCY ON
THE COST OF CAPITAL AROUND THE WORLD

2010

THE EFFECT OF MANDATORY INTERIM REPORTING FREQUENCY ON THE COST OF CAPITAL AROUND THE WORLD

FU RENHUI

Nanyang Business School

A thesis submitted to the Nanyang Technological University
in partial fulfillment of the requirement for the degree of
Doctor of Philosophy

2010

Acknowledgements

I would like to thank those who have helped me during the completion of this thesis. First of all, I would express my deepest gratitude to my supervisor, Dr. Zhang Huai, who has guided my coursework study and dissertation writing throughout the PhD program. Without his supervision and guidance, the completion of the thesis would not be possible. Much credit is also due to Prof. Clive Lennox and Prof. Lilian Ng as well as the members of my dissertation panel, Dr. Tong Yen Hee, Dr. Kevin W L Koh, and Dr. Terence Ng, for providing me with most valuable advice and comments.

I would also acknowledge the studentship offered by Nanyang Technological University, which has financed my research activities during the PhD program. I thank Division of Accounting for providing research funding for my research projects. Furthermore, I would thank all the faculty members at the Nanyang Business School who have helped me during my PhD study.

I would also take the chance to thank all my fellow PhD students who have helped me out of various difficulties at times, whose names are Chen Liang, Zhang Liandong, Miao Bin, Thomas Rockstuhl, Yang Yung Chiang, Shi Linna, Li Yuan, Qian Xiaolin, Dai Lili, Zhang Le, Liu Zhi, Chen Wei, Wang Ying, Elaine, Cai Yu, Deng Xin, Dong Yi, Liu Zhenbin, Wang Ying, Zhang Wenrui, Li Bing, Yin Huifang, Zhou Bo, He Guanming, Wang Zitian, Li Wen and Pang Caiji,. It is great pleasure to study and work with them.

Last but not least, I am most grateful for the love of my family. Over the course of my oversea education they give me support without any condition. I dedicate the thesis to my family.

Table of Contents

I. Introduction	1
II. Regulatory History of Interim Reporting Frequency around the World	7
2.1 Regulation of interim reporting frequency in America	7
2.2 Regulation of interim reporting frequency in Europe	8
2.3 Regulation of interim reporting frequency in Asia Pacific	10
III. Literature Review and Hypothesis Development	12
3.1 Literature on disclosure	12
3.2 Literature on disclosure frequency	15
3.3 Mandatory interim reporting frequency and cost of equity	17
3.4 Moderation role of legal institutions on the cost of capital effect of mandatory interim reporting frequency	19
IV. Research Design	21
4.1 Data of mandatory interim reporting frequency	21
4.2 Data requirement	22
4.3 Measures of cost of equity capital	22
4.4 Measures of cost of debt capital	25
4.5 Cross-sectional regression approach	25
4.5.1 Cost of equity model	26
4.5.2 Cost of debt model	32
4.6 Difference-in-differences analysis approach	34
V. Empirical Results	37

5.1 Sample information.....	37
5.2 Descriptive analysis	38
5.3 Cross-sectional regression analysis of the effect of frequency on cost of capital.....	39
5.3.1 Regression analysis based on cost of equity model	40
5.3.2 Regression analysis based on cost of debt model	42
5.4 Sensitivity analyses	44
5.4.1 Robust measures of cost of equity capital.....	44
5.4.2 Alternative model specifications.....	45
5.4.3 Excluding U.S. and Japanese firms.....	46
5.4.4 Results based on country-level sample	47
5.4.5 Other Issues.....	47
5.5 Difference-in-differences analysis	49
5.6 Does more frequent interim reporting provide more information?	52
VI. Cross-sectional Differences by Legal institutions	55
VII. Conclusion.....	59
APPENDIX I Procedures Used to Collect Frequency Sample.....	61
APPENDIX II Models Used to Estimate the Implied Cost of Equity Capital.....	62
APPENDIX III Variable Definition.....	67
REFERENCES	70
TABLE 1	76
TABLE 2.....	78
TABLE 3.....	80

TABLE 4..... 82

TABLE 5..... 84

TABLE 6..... 86

TABLE 7..... 87

The Effect of Mandatory Interim Reporting Frequency on the Cost of Capital around the World

ABSTRACT

This paper investigates the effect of mandatory interim reporting frequency on the cost of capital, using data from 41 countries. We find that higher interim reporting frequency is reliably associated with lower cost of capital, after we control for firm-specific factors, country-specific factors, additional voluntary reporting, etc. In addition, we hypothesize and find that the cost of capital benefit of higher reporting frequency is more pronounced in countries with stronger legal institutions.

Keywords: Mandatory Interim Reporting Frequency, Cost of Capital, Legal Institutions

JEL Codes: M48, G12, N20, F36

I. Introduction

Mandatory financial reporting frequency differs across countries. For example, listed companies in the United Kingdom and Australia are required to report semiannually while quarterly reporting is required in the United States and Canada. In this paper, we aim to examine whether mandatory financial reporting frequency affects the cost of capital. The answer to which is far from clear. On the one hand, more frequent financial reporting could imply an increase in the amount of information provided by mandatory financial reporting, which is likely to reduce information asymmetry and lower the cost of capital. On the other hand, increases in mandatory reporting frequency may decrease financial intermediaries' incentives to gather information and firms' propensity to issue voluntary disclosures (Gigler and Hemmer, 1998; Einhorn, 2005), leading to a reduction in information available to stakeholders from channels other than mandatory disclosures. It's thus uncertain whether aggregate information is more or less after an increase in mandatory financial reporting frequency. Therefore, whether higher mandatory reporting frequency affects the cost of capital is an empirical issue, which we intend to investigate in this paper.

We collect mandatory financial reporting frequency data for 41 countries for the time period 1989-2007. We use the following two approaches to analyze this issue. The first approach is cross-sectional regression approach. Our empirical results indicate that, after controlling for firm-specific factors, country-specific factors and additional voluntary financial reporting, higher

interim reporting frequency is reliably associated with lower cost of capital. For one more time of mandatory financial reporting, the cost of equity is reduced by between 10 and 40 basis points while the cost of debt is reduced by between 20 and 130 basis points. The cost of capital benefit documented is economically significant but not too large to be implausible. We also conduct sensitivity analyses and our results suggest that our inference is robust towards alternative measures of cost of capital, alternative model specifications and sample restriction.

The second approach, termed as difference-in-difference approach, compares changes in the cost of capital between firms in countries where the mandatory reporting frequency is changed and firms in the U.S. where the mandatory reporting frequency stays the same for the sample period we examine. Essentially, firms in the U.S. serve as a control for any changes induced by changes in the world-wide factors across time. If higher mandatory reporting frequency reduces the cost of capital, we would expect that, changes in the cost of capital would be lower for firms in countries that increase their reporting frequency than for firms in the U.S. The empirical results we obtain are consistent with this expectation and provide further evidence that reporting frequency reduces the cost of capital.

In the additional analyses, we use the abnormal R^2 measure recommended by Ball and Shivakumar (2008) to examine whether more frequent interim reporting simply discloses the same amount of information into

more pieces or provides extra information to the market. The abnormal R^2 measures the proportion of annual return explained by the returns during earnings announcement periods. Higher value of abnormal R^2 means higher level of information content of earnings announcement. We find that the value of abnormal R^2 is highest for quarterly reporters and lowest for annual reporters, and moreover, the value of abnormal R^2 increases as the frequency increases, suggesting that more information is brought to the market by more frequent interim reporting.

We then investigate how a country's legal institutions affect the cost of capital benefit of mandatory interim reporting frequency. Ball et al. (2003) find that the effect of mandated financial reporting standards on financial reporting quality is dependent on institutional environments and in countries with poor investor protection, "high-quality" accounting standards do not have the intended effect, implying that the regulations on interim reporting frequency might not bring capital market benefits without proper enforcement mechanisms. Leuz et al. (2003) find that earnings quality is lower in countries with weaker legal institutions, suggesting that more mandatory disclosures might not be beneficial to the capital market because of their low quality. Therefore, we hypothesize that mandatory reporting frequency has a stronger effect on the cost of capital in countries with stronger legal institutions. We test this hypothesis by partitioning our sample into sub-samples according to different proxies of legal institutions and run separate regressions for each subsample. Our results are generally consistent with our hypothesis.

Our study contributes to the literature on economic consequences of disclosure level. Prior studies examine the relation between cost of capital and firms' disclosure practice. For example, Botosan (1997) finds evidence that disclosures reduce cost of equity for firms with low analyst following. Sengupta (1998) documents a negative relation between the cost of debt and analyst-based (AIMR) evaluations of aggregate disclosure efforts. Francis, Khurana and Pereira (2005) show that both cost of equity and debt capital are lower for firms with higher disclosure score, measured by the number of items disclosed in annual reports, around the world. To the best of our knowledge, no study has examined the effect of mandatory interim reporting frequency on the cost of capital in an international setting. Our paper addresses this gap in literature.

Our study contributes to a growing literature on economic consequences of disclosure regulations. For example, Ferrell (2003) find that the SEC disclosure regulation imposed by Securities Act Amendments of 1964 is associated with a significant reduction in return volatility among OTC securities. Jain et al. (2004) find that market liquidity increases following SOX, implying the disclosure requirement imposed by SOX act increases stock liquidity. La Porta et al. (2006) show that stricter and better enforced securities regulation is associated with financial market development proxied by IPO activity and the size of a country's equity markets. Hail and Leuz (2006) find evidence that the cost of equity capital on the country level is lower for countries with more extensive disclosure requirements, stronger securities regulation, and stricter

enforcement mechanisms. Our study contributes to this line of literature by providing evidence that higher mandatory reporting frequency reduces the cost of capital and that legal institutions influence the cost of capital effect of mandatory financial reporting frequency.

Our paper is closely related to Fu, Kraft and Zhang (2010), who use data from the United States for the period 1950-1973 and find that higher interim reporting frequency is associated with lower information asymmetry and cost of equity. Our paper differs from Fu, Kraft and Zhang (2010) in two important aspects. First, Fu, Kraft and Zhang (2010) focus mainly on *voluntary* financial reporting frequency that is subject to self-selection problem while we focus on *mandatory* financial reporting frequency. Second, results in Fu, Kraft and Zhang (2010) are based on the U.S. data. As our results suggest, legal institutions have an important impact on the cost of capital effect of financial reporting frequency. Specifically, the association between mandatory financial reporting frequency and the cost of capital is significant in countries with strong legal institutions while it is insignificant in countries with weak legal institutions. Thus, findings in Fu, Kraft and Zhang (2010), which are based on the U.S. data, might not generalize to other countries with different institutional features.

Our study is relevant to policy makers. Recently, regulators and industry groups have recommended requiring more frequent interim financial reporting in both the U.S. and other countries (Jopson, 2006; Yiu, 2009). Our paper examines the cost of capital effect of mandatory financial reporting frequency

and our findings are potentially useful to regulators in deciding whether to impose more frequent interim reporting. In addition, we find that the cost of capital effect of more frequent financial reporting is more pronounced in countries with stronger legal institutions. One implication is that countries with strong legal institutions may reap more cost of capital benefits by requiring higher reporting frequency. However, without a detailed analysis of the costs of increased reporting (e.g., out-of-pocket costs, proprietary costs), we cannot conclude that increasing reporting frequency would result in a net benefit for shareholders and other stakeholders.

The rest of this paper is organized as follows. Section 2 summarizes the regulatory history of interim reporting frequency around the world. Section 3 reviews prior literature and develops the hypotheses. Section 4 covers sample formation, variable definitions and research methodology. Section 5 presents the main results including robustness checks. Section 6 investigates how legal institutions influence the cost of capital effects of more frequent financial reporting. Section 7 summarizes and concludes the study. In Appendix I, we describe how we collect our frequency data. In Appendix II, we delineate the estimation procedure of the implied cost of capital measures. In Appendix III, we summarize the definitions of the variables used in our study.

II. Regulatory History of Interim Reporting Frequency around the World

In this section, we provide brief review on the regulation history of interim reporting frequency around the world.¹ The regulations could be from stock exchanges or from government regulators. The following discussion is based on the requirement from both.

2.1 Regulation of interim reporting frequency in America

In the U.S., in early 1920s, NYSE started to require all newly listed companies to publish quarterly financial statements and continuously pushed the already-listed companies to do the same. AMEX and the other exchanges lagged behind due to the concern of unduly burden on listed firms and similar actions were not taken by AMEX until 1962. From the government perspective, annual reporting is mandated by the Security Exchange Act of 1934. The SEC mandated semiannual reporting in 1955 and quarterly reporting in 1970. Even though quarterly reporting is the highest frequency of interim reporting in the world so far, there are pushes from investors and practitioners for more frequent reporting. For example, PwC, Deloitte, KPMG and Ernst & Young called for static quarterly financial statements to be replaced by real-time, internet-based reporting encompassing a wider range of performance measures (Jopson, 2006). The AICPA advocated for “increased reporting frequency, with an ultimate goal

¹ Please refer to Table 1 and Table 6 for the details about the level as well as the changes of mandatory interim reporting frequency.

of on-line, real-time reporting” in Congressional testimony (Elliott, 2000).

The other two North America countries, Canada and Mexico, generally follow the U.S. on interim reporting requirement and mandates quarterly reporting in our sample period.

In South American, Brazil required quarterly reporting as early as 1989.

2.2 Regulation of interim reporting frequency in Europe

The interim reporting frequency issue has been keep attracting attention from regulators in EU. Most EU countries currently mandate semiannual reporting. During the early 2000s, the European Commission proposed to mandate quarterly reporting in its draft transparency directive for all firms listed on the EU stock exchanges. Advocates argued that compared to semiannual reporting, quarterly reporting would improve corporate transparency and the efficiency of European capital markets. Opponents countered that quarterly reports would only substitute for other disclosures and do not increase the total information level available to investors (Financial Times, 2003). EU finally decided to drop the proposal due to the strong opposition from countries such as U.K.

As an alternative, EU proposed to mandate quarterly management reporting, i.e., two extra management statements during the period between annual reporting and semiannual reporting. Such a statement shall contain information covering the period between the beginning of the relevant six-month period and the date of publication of the report and provide:

— an explanation of material events and transactions that have taken place during the relevant period and their impact on the financial position of the issuer and its controlled undertakings, and

— a general description of the financial position and performance of the issuer and its controlled undertakings during the relevant period.

The proposal was endorsed by the European Parliament on 24 October 2006. Member States are due to write the Transparency Directive into their national laws by 20 January 2007, and start implementing those measures a year later. France and Switzerland first mandated the regulation in 2007, followed by Austria, Belgium, Germany, Denmark, Spain, Finland, Ireland, Italy, Luxembourg, Sweden, and United Kingdom in 2008. Netherlands postponed the effective date of the regulation to 2009.

Although most European countries mandate semiannual reporting only, there are some exceptions. Greece, Norway and Turkey currently require quarterly reporting. Germany, Sweden and Portugal require some listed firms to report quarterly. Specifically, Germany requires quarterly reporting for firms listed as Prime Standard on its largest stock exchange (Deutsche Börse) while firms listed on other stock exchanges, such as Börse Berlin, are only required to report semiannually. Similarly, in Sweden, quarterly reporting is mandated for firms listed on NASDAQ OMX TALLINN and Nordic Growth Market, but not for firms listed on other stock exchanges. Portugal requires quarterly reporting for firms that satisfy conditions related to firm size.² Luxembourg lagged

² To be specific, issuers subject to Portuguese Law are obliged to disclose quarterly information, on shares

behind other European countries in terms of interim reporting frequency. Listed firms in Luxembourg were required to report annually only before 2008 when semiannual reporting across EU becomes mandatory.

2.3 Regulation of interim reporting frequency in Asia Pacific

In Japan, Tokyo stock exchange mandates quarterly reporting since 2004 while other stock exchanges such as Jasdac Securities Exchange remain the semiannual reporting requirement until 2007. Since 2008, all listed firms in Japan have to report quarterly. Furthermore, the contents required to be described in each quarterly report are required to be the same as semi-annual securities report.

In Hong Kong, there has been a lot of debate whether quarterly reporting should be mandated in the last ten years. The Hong Kong stock exchange had two rounds of consultation in 2002 and 2007 to propose that all main-board companies issue quarterly reports, but the efforts failed because of opposition by listed companies. Till now main-board companies only need to report results every six months, while firms listed in the enterprise market have to provide quarterly reporting, even though they are relatively smaller than those listed in the main board. Another consultation is made at the end of year 2009 and the discussion is still ongoing.

In Singapore, quarterly reporting is mandated in year 2003 and before

admitted to trading on a regulated market that surpass two of the following limits during two consecutive years: a) Total balance sheet: Euro 100 millions; b) Total on net sales and other proceeds: Euro 150 millions; c) Average number of employees during the financial year: 150.

that only semiannual reporting is required. For firms with a market capitalization of 75 million Singapore dollars and below, the quarterly reporting requirement is waived. Singapore government reviews its quarterly reporting policy in 2006 and decides to retain mandatory quarterly reporting.

The rest of the Asia-Pacific countries in our sample require either semiannual reporting (Australia and New Zealand) or quarterly reporting (China, India, Pakistan, Malaysia, Korea, Philippines and Thailand).

III. Literature Review and Hypothesis Development

This section has four subsections. The first subsection reviews literature on disclosures in general and the second subsection focuses on literature related to reporting frequency. The third and fourth subsections develop hypotheses.

3.1 Literature on disclosure

Economic theories generally suggest that disclosures can improve a firm's information environment and have positive effects on liquidity, cost of capital and firm valuation. More public information released in disclosures will reduce the information asymmetry between informed and uninformed investors ("level the playing field") and hence reduce the price protection required by uninformed investors, leading to lower trading costs and higher stock liquidity (Verrecchia, 2001). The cost of capital is reduced due to the lower trading costs, larger investor base and lower estimation risk (e.g., Coles et al., 1995). The firm value will increase due to higher future cash flows caused by better managerial investment decisions and less managerial appropriation, besides the effects from lower cost of capital. The costs of disclosures include direct costs such as preparation, certification and dissemination of accounting reports, and indirect costs such as proprietary costs. A firm's disclosures could have externalities. For example, managers could use the public information disclosed by firms in the same industry to make better investment decision. Investors could use information from other firms to evaluate the performance of managers relative to his peers. Disclosures can be further classified into voluntary disclosures and

mandatory disclosures and there is an important distinction between them. Firms assess benefits and costs when making voluntary disclosure decisions. Thus, firms' voluntary disclosures can potentially serve as a signal to investors. For example, issuing management forecasts can be deemed as a signal for managerial confidence in meeting the target. Mandatory disclosures, on the other hand, do not consider firm-specific factors and thus can not serve the signaling purpose.

From the perspective of empirical evidence, there is little controversy for the capital market benefit of voluntary disclosures. For example, Botosan (1997) finds that cost of equity is negatively related with disclosure scores for firms with low analyst following. Sengupta (1998) find that the cost of debt is negatively related with analyst-based (AIMR) disclosure score, which is the summary measure of disclosure level in annual and quarterly reports, proxy statements, other published information and direct communications to analysts. Francis, Khurana and Pereira (2005) find that larger number of items disclosed in annual reports are associated with lower cost of both debt and equity capital across a range of countries.

Evidence on the merit of mandatory disclosures, however, is mixed. On the one hand, some studies find that mandatory disclosure can have positive capital market consequences. For example, Ferrell (2003) analyzes the Securities Act Amendments of 1964 and find that the imposition of SEC disclosure regulation is associated with a significant reduction in volatility among OTC securities, relative to securities that are already subject to SEC

disclosure requirements, suggesting quicker price impounding and price efficiency. Jain et al. (2004) examine changes in market liquidity around SOX and document an improvement in liquidity following SOX, suggesting SOX act mandating more extensive disclosure such as disclosure on internal control reduces information asymmetry and increase stock liquidity. La Porta et al. (2006) investigate securities regulation and financial development across 45 countries and find evidence suggesting that stricter and better enforced securities regulation is associated with financial market development proxied by IPO activity and the size of a country's equity markets. Building on the dataset provided in La Porta et al. (2006), Hail and Leuz (2006) examine cross-country differences in firms' cost of equity and their relation with countries' legal institution and securities regulation mechanism. They find evidence that the cost of equity capital on the country level is lower for countries with more extensive disclosure requirements, stronger securities regulation, and stricter enforcement mechanisms.

While regulations are generally designed to protect investors' interest and enhance liquidity, some other studies find unintended consequences associated with mandatory disclosure. Bushee and Leuz (2005) examine the impact of "Eligibility Rule" of 1999, which subjects small firms traded on the OTC Bulletin Board (OTCBB) to SEC's higher disclosure requirement. They document that the imposition of disclosure requirements results in significant costs for smaller firms, forcing them off the OTCBB. Meanwhile, they also find that OTCBB firms that were already subject to SEC's higher disclosure

requirement experience positive abnormal returns while firms that were compelled to adopt SEC disclosures to avoid removal from the OTCBB experience increase in liquidity. Engel et al. (2007) analyze firms' going-private decisions around SOX and market responses to these decisions. They find evidence suggesting that firms avoid the costs associated with SOX by going private and do so when the costs imposed by SOX outweigh the benefits generated by SOX. Leuz et al. (2008) examine the phenomenon that a considerable number of public firms deregister their securities from the SEC, cease to make periodic filings to the SEC, but continue to trade publicly in the Pink Sheets where do not require SEC registration. They find evidence that for many firms cost savings are the primary reason for "going dark activities", which in turn suggests that the disclosure requirement of Sarbanes-Oxley Act imposes substantial costs on firms, inhibits optimal outcomes for some firms and forces them to cease SEC reporting or delist from exchanges.

3.2 Literature on interim reporting frequency

The disclosures, mostly voluntary disclosures, have been widely examined both theoretically and empirically. However, the empirical evidence on interim reporting frequency is relatively sparse. One of the reasons might be the difficulty in identifying a sample where firms exhibit cross-sectional or time-series variation in interim reporting frequency. Existing literature on interim reporting frequency in U.S. mostly focuses on the time period before 1970 when interim reporting frequency still has some cross-sectional variance.

Leftwich et al. (1981) summarizes the history of interim reporting frequency requirements in the U.S. and examine the interim reporting frequency of firms over the period 1937-1948 and find that interim reporting frequency history and stock exchange are two main determinant factors. McNichols and Manegold (1983) examine the increase of interim reporting frequency from annual reporting to semiannual reporting or quarterly reporting for 34 AMEX firms during the 1960's. They find that quarterly reporters display a less return variability surrounding their annual earnings release than annual reporters or semiannual reporters, suggesting that interim reports reduce the marginal information provided by annual reports. Butler et al. (2007) investigate the effects of interim reporting frequency on earnings timeliness in the time period between 1950 and 1973 when there is significant cross-sectional and time-series variance in reporting frequency, and find that the information in annual earnings was impounded into price more quickly for voluntary switches from semiannual reporting to quarterly reporting but not for mandatory switches. Fu, Kraft and Zhang (2010) use the same dataset to look at the effects of interim reporting frequency on information asymmetry and cost of equity. They find that higher interim reporting frequency is associated with lower information asymmetry and cost of equity.

There are a few studies examining the interim reporting frequency outside of the U.S. Alford et al. (1993) analyze return-earnings relationships and return timeliness across 17 countries and find their sample countries exhibit significant cross-sectional variation in mandatory interim reporting frequency

and return timeliness. Recently, Cuijpers and Peek (2010) examine the voluntary quarterly reporting in three western European countries including U.K., Netherland and Denmark where only semiannual reporting is required. They find that interim reporting frequency has no effect on the average precision of investors' information but reduces investors' incentives to acquire private information and consequently reduce information asymmetry among investors proxied by bid-ask spread, increase share liquidity, and stimulate trading.

3.3 Mandatory interim reporting frequency and cost of capital

We first analyze the mandatory interim reporting frequency from theoretical perspective. By definition, more frequent interim reporting means more periodic financial information is released during the year. Given the assumption that more frequent interim reporting provides more information, the information asymmetry between informed and uninformed investors will naturally reduce. Price protection will be reduced accordingly, leading to lower required rate of return. In addition, more public information about firms could increase firms' exposure to investors and enlarge their investor base, which in turn improves risk sharing and lowers the cost of equity capital. Finally, more public information could reduce cost of equity capital by reducing the estimation risk. For example, Coles et al. (1995) find that securities with long time-series of returns have lower betas and expected returns than those with short time-series of returns in an environment of asymmetric parameter

uncertainty. For the effects on cost of debt capital, the mechanisms might be different. More disclosures can decrease the costs of contracting between borrowers and lenders, particularly for public debt contracts (e.g., Hart, 1995; Ball, Hail and Vasvari, 2009). In turn, this should reduce the price protection required by lenders and translate into lower borrowing costs.³ In another word, lenders will charge lower interest rate to firms with more public disclosures when the contracts, including both short-term and long-term contracts, are renewed. Investor base (lender base in this case) argument and estimation risk argument are not investigated in the existing literature on cost of debt at least based on so far what we know, although they could be potential reasons for reporting frequency having effects on cost of debt.

The question of the net effect of more frequent interim reporting on information quantity is complicated by the influence of reporting frequency on the incentives of competing information sources such as financial analysts and firms' decisions on voluntary disclosures. More frequent reporting could discourage analyst forecasts by reducing the information gap between market's expectation of earnings and the expectation conditional on full information and thereby reducing the rents to the information provided by analysts. In addition, more frequent mandatory reporting could reduce firms' voluntary disclosures. Gigler and Hemmer (1998, 2001) predict that more mandatory interim reporting may induce firms to reduce voluntary disclosures by increasing the overall cost of disclosure (e.g., production and dissemination costs, legal costs, proprietary

³ The argument mainly applies for short-term borrowing as well as external bond funding but not for borrowing from banks that normally have private access to firms' financial information.

costs, or agency costs) or by reducing the value of each additional voluntary disclosure.

To sum up, whether more mandatory interim reporting increases the overall information level of firms is unclear from theoretical perspective. We argue that an increase in reporting frequency unambiguously increases the amount of information and this effect is dominant. We thus predict a negative relation between mandatory reporting frequency and the cost of capital. We form our first hypothesis as below:

H1: Mandatory interim reporting frequency reduces cost of capital.

3.4 Moderation role of legal institutions on the cost of capital effect of mandatory interim reporting frequency

Legal institutions can influence the cost-of-capital effect of mandatory interim reporting frequency. Prior research suggests that regulations alone are unlikely to be effective without proper enforcement mechanisms (e.g., Hail and Leuz, 2006). Using data from Hong Kong, Malaysia, Singapore, and Thailand, Ball et al. (2003) find that the effect of mandated financial reporting standards on financial reporting quality is dependent on institutional factors and that “high-quality” accounting standards do not have the intended effect in countries with poor investor protection. Following their argument, it is possible that in institutional environments with weak legal institutions, disclosure regulations are not properly enforced and hence the desired effects are unlikely demonstrated. In addition, low information quality could be another reason for

the unintended effects of more mandatory disclosures. In countries with weaker legal institutions, information quality might be lower (e.g., Leuz et al., 2003) and investors do not perceive the information in more mandatory disclosures as of high quality and credible and therefore there is no capital market benefit associated with that. To sum up, the cost of capital benefit of more frequent reporting might be strengthened by legal institutions due to either better enforcement mechanisms or higher information quality.

We thus propose our second hypothesis as below:

H2: The cost-of-capital effects of mandatory interim reporting frequency are stronger in countries with stronger legal institutions.

IV. Research Design

In this section, we provide details on our empirical investigations, including how we get our frequency data, how we form our sample, how we estimate cost of equity capital and cost of debt capital, and the details of our two investigation approaches—cross-sectional regression and difference-in-differences analysis.

4.1 Data of mandatory interim reporting frequency

The Center for International Financial Analysis and Research (CIFAR) provides the index on interim reporting frequency (1989, 1991, 1993, and 1995). A score of 4 means quarterly reporting; 2, semiannual reporting; 1, annual reporting; and so forth. CIFAR only provides frequency data for the four years and does not include changes in frequency requirements between those four years and frequency requirements after 1995. To get more frequency data, we have searched the Web sites of security exchanges and regulators for information on reporting frequency. If such information is not available, we follow the data collection procedures of CIFAR to collect frequency data (see Appendix I). After complementing the CIFAR data, we have compiled what we believe to be the most complete data on mandatory reporting frequency around the world at this time. Our frequency sample covers 41 countries from 1989 to 2007.

4.2 Data requirement

Financial data are from Compustat Global,⁴ while analyst forecasts and share price information are from I/B/E/S. The sample period is from 1989 to 2007.⁵ Financial data are measured as of the end of the fiscal year, and analyst forecasts and stock prices are measured as of month +10 (i.e., 10 months after the end of the fiscal year), which ensures that financial data are publicly available and priced at the time of the computation of cost of equity capital.⁶ We eliminate the data meeting either of the following conditions: (1) the inflation rate for the country in that year is above 25%⁷ or (2) we do not have frequency data for the country. Our sample consists of 66,863 firm years and provides the basis for our analysis.

4.3 Measures of cost of equity capital

Measuring firms' cost of equity capital is difficult. Previous literature use realized return, or expected return based on market model, Fama-French three factor or four factor model, as the proxies. However, realized returns capture changes in market expectations about firms' future cash flows and expected return approach requires fairly long time-series. Furthermore, international asset pricing models require assumptions regarding the degree of

⁴ We realize that some studies get financial data from Worldscope Database. Ulbricht and Weiner (2005) show that the use of Compustat and Worldscope databases leads to the same inferences.

⁵ Our results based on sample after 1990 are similar, suggesting that the limited coverage of I/B/E/S database before 1990 does not bias our results.

⁶ Our results based on month +4 have similar implications.

⁷ The criterion is imposed to prevent extreme observations from unduly affecting our firm-year regressions. For example, we assume the expected long term growth rate equals to inflation rate. Abnormally high inflation rate will cause the extremely large cost of capital estimates. However, the results do not hinge on the criterion and are very similar without it.

market integration, which is under debate (Hail and Leuz, 2006).

To avoid the limitations of the above approaches, we employ accounting-based valuation models that estimate the ex ante rate of return implied in contemporaneous stock price and analyst forecast data. This approach does not rely on extensive time-series of past return data and it does not require any priori assumptions about the degree of market integration. Moreover, those models explicitly attempt to separate cash flow effects from cost of capital effects and hence avoid the shortcomings of realized return as the proxies of cost of equity capital.

We use four models to estimate the cost of equity capital (e.g., Dhaliwal et al., 2006, Hail and Leuz, 2009). They are based on Gebhardt et al. (2001), Claus and Thomas (2001), Gode and Mohanram (2003) and Easton (2004). All four models are consistent with the discounted dividend valuation model but exploit basic accounting relations to obtain an equivalent valuation equation based on residual income or abnormal earnings. Through substituting market price and analyst forecasts into the valuation equation, we back out the cost of capital as the internal rate of return that equates current stock price and the sequence of expected future residual incomes or abnormal earnings. The rate is an ex ante estimate of the cost of equity capital implied in the stock price.

Differences among the four models include the different needs for analyst forecast data, the assumptions regarding short- and long-term growth, the explicit forecasting horizon, and whether or not and how inflation is incorporated into the steady-state terminal value. In Appendix II, we summarize

the four models, describe their key assumptions and data requirements, explain how we implemented the models in an international setting, and gauge the impact of the numerical procedures used to iteratively solve the models.

Although the four methods are widely used as proxies of cost of capital, their validity is still under debate. One concern is that whether implied cost of capital measures appropriately capture risk premium. Easton and Monahan (2005) and Guay et al. (2005) argue that the measures are poor because they are negatively correlated with risk proxies, including beta and other proxies of cost of capital such as realized returns. However, the significantly positive correlation between our implied cost of capital measures and traditional risk proxies, including beta, firm size and book to market ratio, partially relieves such concerns. There are also concerns that implied cost of capital measures suffer from substantial measurement error from sources such as noisy or slowly updated analyst forecasts (Easton and Monahan, 2005; Guay et al., 2005). We first try to address the issue by averaging over the four proxies and use the mean estimate as our primary measure of cost of equity capital. Averaging should reduce idiosyncratic measurement error across the models. To further ensure the robustness of our results, we use estimates from each model separately, the first principal component of the four estimates, and weight the estimates by the quality of the input parameters or the fit of the individual models. In addition, we use dividend yields, which is non-accounting based and hence does not subject to the limitations of implied measures, as another cost of equity capital measure in the robust test (see Bekaert and Harvery, 1995;

Errunza and Miller, 2000). We find that dividend yield, calculated as last year's actual dividends divided by stock price as of month +10, is significantly correlated with our implied cost of capital measures (Spearman correlation $\rho=0.349$ in the country-level sample, similar to Hail and Leuz, 2006). Furthermore, we find our average implied cost of capital measure is positively significantly correlated with other non-accounting based proxies including expected returns extracted from realized returns and countries' credit risk ratings, suggesting that our measures reasonably capture risk premiums (see also Hail and Leuz, 2009).

4.4 Measures of cost of debt capital

Following Francis, Khurana and Pereira (2005) and Francis, LaFond, Olsson and Schipper (2005), cost of debt capital is the interest rate on the firm's debt, which is measured as interest expense for the year divided by average short- and long-term debt during the year.⁸ This measure is a cumulative proxy, capturing the cumulative effect of debt financing decisions of a firm.

4.5 Cross-sectional regression approach

We use two approaches to test our hypothesis: cross-sectional regression and difference-in-differences analysis. In the cross-sectional regression approach, we regress our cost of capital measures on mandatory interim reporting frequency after controlling for other risk measures. Our results are

⁸ We do not use the ex ante measure of cost of debt based on credit rating is because the data on the credit rating at the firm level is not available in the international setting based on so far what we know.

based on firm level. The approaches are similar to Defond et al. (2007) and Hail and Leuz (2009).

4.5.1 Cost of equity model

We model cost of equity capital as a function of mandatory interim reporting frequency, the voluntary component of interim reporting frequency, firm size, return on assets (ROA), leverage ratio, return variability, book-to-market ratio, earnings variance, turnover, past year's return, forecast bias, inflation rate, anti-self-dealing index, legal tradition, the disclosure regulation index, the securities regulation index, the rule of law index, block premium, equity market development index, a country's per capita GDP, the concentration of political power, industry dummies and year dummies. We use the voluntary component of interim reporting frequency to control for possible confounding effect of voluntary disclosure on cost of equity in our sample. Voluntary disclosures as widely documented to be inversely related to cost of capital (e.g., Francis, Khurana and Pereira, 2005), we predict a negative sign on its coefficient. We include a number of traditional risk factors at the firm level. Based on prior empirical studies on the cross-sectional determinants of returns, we expect the cost of equity to exhibit a negative relation with firm size and positive relation with return variability⁹ and financial leverage (e.g., Fama and

⁹ We control for return variance instead of beta, since the calculation of beta needs to assume the integration of world capital markets, which is under debate. Following Hail and Leuz (2006) and Hail and Leuz (2009), we control for only return variance in our regression. Our results are similar if we replace return variance with beta, measured as the slope coefficient in the five-year market model regressing stock return on the Morgan Stanley Capital International World Index.

French, 1992). ROA is included to control for default risk as well as cross-country accounting differences such as accounting standard difference. No sign is predicted given the mixed or insignificant results in previous studies. We use book-to-market ratio to control for default risk (Fama and French, 1992), differences in firms' growth opportunities (e.g., La Porta et al., 2002) as well as differences in the accounting rules (e.g., Joos and Lang, 1994). A positive sign is expected. Earnings variance is used to proxy macroeconomic variability at the firm level (Hail and Leuz, 2006) and hence we expect it is positively related to our cost of capital measure. We use turnover to control for liquidity (Lau et al., 2010) and past year's return performance to control for momentum effects (Lau et al., 2010) and the confounding effect of analysts' sluggish revisions of their forecasts to past price performance (Guay et al., 2005). No sign is predicted for these two variables given the mixed or insignificant results in previous findings.

Forecast bias is included, since the estimates of cost of capital are based on data of analyst forecast and any cross-country forecast bias affects the cost of capital measures. For example, if forecasts in a particular country tend to be optimistic but market participants understand this bias and properly adjust prices, implied cost of equity models upwardly biased estimates. Given that analyst forecasts are mostly optimistic, we expect a positive effect on cost of equity. Inflation is used to control for the possibility that analysts might incorporate expected inflation rates in their forecasts, since the forecasts are

expressed in nominal terms and local currency. The variance of inflation rate might explain part of the international difference in cost of capital. We use inflation as an additional control variable rather than use inflation-adjusted measure of cost of equity since investors' expectations for future inflation are only imperfectly observable and the effect of inflation on cost of capital might be less than 1.

We employ nine variables to capture the cross-country institutional differences. La Porta et al. (2002) document that individual firms are valued more highly in countries with strong investor protection laws and Djankov et al. (2008) suggest that the anti-self-dealing index can represent the legal protection of minority shareholders against expropriation by controlling insiders. Hence we include anti-self-dealing index to control for investor protection. La Porta et al. (1997) and Ball et al. (2000) suggest that legal tradition could have significant impact on disclosure regulation. The common law/code law dummies are used to proxy legal tradition. Hail and Leuz (2006) find that disclosure requirement, securities regulation, and enforcement mechanisms could have significant impact on cost of capital. Therefore, we include the disclosure regulation index, the securities regulation index and the rule of law index in our model. Dyck and Zingales (2004) use the block premiums paid in transactions involving corporate controls to measure the private benefit of control and find supporting evidence that higher private benefits of control are associated with less developed capital markets, more concentrated ownership, and more privately negotiated privatizations. We use block premium index to

control for the potential confounding effects. Less developed capital markets may have characteristics such as weak enforcement mechanism as well as poor information environment that might confound the effects of mandatory interim reporting frequency. We follow Hail and Leuz (2009) and use the average of three indexes in La Porta et al. (1997) to measure equity market development. A country's per capita GDP reflects the level of wealth and it is included to control for other confounding effects associated with that. The concentration of political power sharply restricts or suppresses competitive political participation and reduces press freedom. We follow (Bushman et al., 2004) and use it to control for potential effects of autocratic regimes on corporate transparency and further cost of capital.

Industry dummies are controlled due to the concern that there is substantial variation in factor loadings across industries (Fama and French, 1997). Year dummies are used to control for time-series variation in risk-free interest rates. In the country-year setting, the T-bill rate is a yearly constant; hence, year-fixed effects control for time-series variation in the risk-free rate. We address the sensitivity of our results controlling for risk-free rate in the robust test.

The model is as below:

$$\begin{aligned}
 r_{AVG_{it}} = & \alpha_0 + \alpha_1 FREQ_{it} + \alpha_2 VolFreq_{it} + \alpha_3 SIZE_{it} + \alpha_4 ROA_{it} + \alpha_5 LEV_{it} + \alpha_6 RETVAR_{it} + \alpha_7 B \\
 & MR_{it} + \alpha_8 EPSVAR_{it} + \alpha_9 TURN_{it} + \alpha_{10} LAGRET_{it} + \alpha_{11} FBILAS_{it} + \alpha_{12} INFL_{it+1} + \alpha_{13} ANTS \\
 & EL_{it} + \alpha_{14} Common_{it} + \alpha_{15} DISREG_{it} + \alpha_{16} SECUREG_{it} + \alpha_{17} LAW_{it} + \alpha_{18} BLOCK_{it} + \alpha_{19} EM \\
 & D_{it} + \alpha_{20} GDPCap_{it} + \alpha_{21} AutoC_{it} + \sum \alpha_j INDUSTRY_{it} + \sum \alpha_k YEAR_{it} + \varepsilon_{it}
 \end{aligned} \tag{1}$$

where:

r_{AVG} = the mean of the four estimates for the implied cost of equity capital as described in Appendix II.

$Freq$ = interim reporting frequency mandated in a country, ranging from 1 to 4.

$VolFreq$ = the voluntary component of interim reporting frequency, equal to the difference between actual frequency from I/B/E/S database and mandatory frequency.

$SIZE$ = the natural log of a firm's market capitalization in dollars at the beginning of the calendar year.

ROA = the return on assets measured as net income divided by total assets.

LEV = the ratio of short- and long-term debt to total assets.

$RETVAR$ = the standard deviation of daily stock returns over the last 12 months.

BMR = the ratio of book value to market value of equity at the beginning of the calendar year.

$EPSVAR$ = a firm's standard deviation of annual earnings per share over last five years scaled by month +10 price.

$TURN$ = the mean monthly trading volume over the prior 12 months divided by the number of shares outstanding.

$LAGRET$ = the accumulated return in the past 12 months.

$FBIAS$ = the mean one-year-ahead consensus forecast minus the actual

earnings reported in I/B/E/S.

INFL = yearly median of country-specific, one-year-ahead realized monthly inflation rates. Inflation data are provided by the Datastream database.

ANTSEL = the anti-self-dealing index representing the legal protection of minority shareholders against expropriation by controlling insiders (Djankov et al., 2008).

Common = the common law/code law dummies (La Porta et al., 1997).

DISREG = the disclosure regulation index measuring the level of disclosure regulation based on an index of disclosure requirements in securities offerings (Hail and Leuz, 2006).

SECREG = the securities regulation index capturing the effectiveness of a country's securities regulation by combining the disclosure requirements index with the liability standard and the public enforcement indices (Hail and Leuz, 2006).

LAW = the rule of law index representing the general quality of the legal environment (Hail and Leuz, 2006).

BLOCK = the block premiums paid in transactions involving corporate controls measuring the private benefit of control (Dyck and Zingales, 2004).

EMD = the measure of equity market development equal to the average percentage rank across the three La Porta et al. (1997) variables (i) ratio of the aggregate stock market capitalization held by minorities to gross national product, (ii) number of listed domestic firms relative to the population, and (iii) number of IPOs relative to the population.

$GDPCap$ = a country's per capita GDP in 100,000 US dollars, reflecting the level of wealth of a country.

$AutoC$ = the concentration of political power equal to the average of autocracy index between 1960 and 1994 (Bushman et al., 2004).

$INDUSTRY$ = industry dummies.¹⁰ Following DeFond et al. (2007), we use I/B/E/S sector data, which includes 11 sectors: finance, health care, consumer non-durables, consumer services, consumer durables, energy, transportation, technology, basic industries, capital goods, and public utilities.

$YEAR$ = year dummies.

4.5.2 Cost of debt model

For cost of debt, we model it as a function of mandatory interim reporting frequency, the voluntary component of interim reporting frequency, firm size, return on assets (ROA), leverage ratio, return variability, book-to-market ratio, bank rate, accounting performance variance, interest coverage ratio, inflation rate, anti-self-dealing index, legal tradition, the disclosure regulation index, the securities regulation index, the rule of law index, block premium, equity market development index, a country's per capita GDP, the concentration of political power, industry dummies and year dummies. The voluntary component of reporting frequency is included to control for the

¹⁰ We don't control for country dummies in our regressions based on two reasons. First, controlling for country dummies drops cross-country difference and focuses only on the time-series difference, which will sacrifice statistical power since most of our sample firms do not experience changes in mandatory frequency (Zhou, 2001). Second, our results in difference-in-difference analysis play a similar role as the cross-sectional regression results controlling for country dummies. To avoid the redundancy, our main results are based on models without controlling for countries dummies, including cost-of-equity regressions and cost-of-debt regressions.

effect of voluntary disclosure. Firm size is used as an adverse proxy of firm risk. ROA and leverage ratio are used to capture the default risk. The higher ROA, the lower the probability that the firm could default; hence, the coefficient on ROA is expected to be positive. By contrast, the higher leverage ratio, the higher the default risk. Hence, the coefficient on leverage ratio is expected to be negative. Bank rate can be viewed as providing a benchmark interest rate relative to which all other borrowers pay a default risk premium. The higher the benchmark rate, the higher the cost of borrowing. Consequently, the coefficient on bank rate is expected to be positive. Accounting performance variance is used to capture firm risk and interest coverage ratio is used to measure firms' debt paying ability and further default risk. Positive sign is expected in the front of the coefficients of the two variables. Since bank rate might not be adjusted frequently and might lag behind real market interest rate, and lenders might adjust their charges to borrowers according to real market interest rate as well as anticipated inflation rate, we additionally include inflation rate to capture such effect. Industry dummies are included to control for any cross-industry differences and year dummies are included to control for any time-series trend. The rest of the variables are included to capture the cross-country variance in institutional environment, similar as in the model of cost of equity capital.

The regression model for cost of debt capital is as below:

$$\begin{aligned} CostDebt_{it} = & \alpha_0 + \alpha_1 FREQ_{it} + \alpha_2 VolFreq_{it} + \alpha_3 SIZE_{it} + \alpha_4 ROA_{it} + \alpha_5 LEV_{it} + \alpha_6 RATE_{it} + \alpha_7 \sigma(NIBE)_{it} \\ & + \alpha_8 IntCov_{it} + \alpha_9 INFL_{it+1} + \alpha_{10} ANTSEL_{it} + \alpha_{11} Common_{it} + \alpha_{12} DISREG_{it} \\ & + \alpha_{13} SECREG_{it} + \alpha_{14} LAW_{it} + \alpha_{15} BLOCK_{it} + \alpha_{16} EMD_{it} + \alpha_{17} GDPCap_{it} + \alpha_{21} AutoC_{it} + \end{aligned}$$

$$\sum \alpha_j INDUSTRY_{it} + \sum \alpha_k YEAR_{it} + \varepsilon_{it} \quad (2)$$

where:

CostDebt = the interest expense for the year divided by average short- and long-term debt during the year.

RATE = the country-specific bank rate that applies to the short- and medium-term financing needs of the private sector, normally differentiated according to creditworthiness of borrowers and objectives of financing. The data are from IMF/International Financial Statistics database.

$\sigma(NIBE)$ = the accounting performance variance, calculated as the standard deviation of the net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period. We require at least five observations of NIBE to calculate the standard deviation (Francis, LaFond, Olsson and Schipper, 2005).

IntCov = the interest coverage ratio, calculated as the ratio of operating income to interest expense (Francis, LaFond, Olsson and Schipper, 2005).

Other variables are defined as above.

4.6 Difference-in-differences analysis approach

We first follow Daske, Hail, Leuz and Verdi (2008) and use univariate difference-in-differences design to examine the change in cost of capital one year before and one year after a mandatory change in interim reporting frequency.¹¹ Specially, we match each event firm with a control firm with the

¹¹ We have picked time window (-1,1) due to the fact that some countries, such as China and

same industry and the closest firm size from United States, where the mandatory interim reporting frequency does not change in our sample period.¹² Then we calculate the change in cost of capital for event and control firms and finally calculate the difference between the change for event firms and the change for control firms. The advantage of this design is that it can control for unobserved differences between event and control firms and adjust observed changes for the event firms by concurrent changes that are also experienced by the control firms.

However, the results from univariate difference-in-differences design might be confounded by concurrent changes in other risk factors. For example, it is possible that the change in cost of capital around the frequency change is due to the concurrent change in inflation rate rather than the change in frequency. To address such concern, we follow Daske, Hail, Leuz and Verdi (2008) and run the following difference-in-differences regression:

$$\begin{aligned}
COC_{it} = & \alpha_0 + \alpha_1 EVENT * AFTER_{it} + \alpha_2 EVENT_{it} + \alpha_3 AFTER_{it} + \alpha_4 SIZE_{it} + \alpha_5 ROA_{it} \\
& + \alpha_6 LEV_{it} + \alpha_7 RETVAR_{it} + \alpha_8 BMR_{it} + \alpha_9 EPSVAR_{it} + \alpha_{10} TURN_{it} + \alpha_{11} LAGRET_{it} \\
& + \alpha_{12} FBIAS_{it} + \alpha_{13} RATE_{it} + \alpha_{14} \sigma(NIBE)_{it} + \alpha_{15} IntCov_{it} + \alpha_{16} INFL_{it} + \alpha_{17} ANTSEL_{it} \\
& + \alpha_{18} Common_{it} + \alpha_{19} DISREG_{it} + \alpha_{20} SECREG_{it} + \alpha_{21} LAW_{it} + \alpha_{22} BLOCK_{it} + \alpha_{23} EMD_{it} \\
& + \alpha_{24} GDPCap_{it} + \alpha_{25} AutoC_{it} + \sum \alpha_j INDUSTRY_{it} + \sum \alpha_k YEAR_{it} + \varepsilon_{it}
\end{aligned} \tag{3}$$

Malaysia, implement the reporting frequency change in the middle of the year. For these observations, the effect in the time window (-1,0) will be attenuated. However, we find similar results when we rely on the time window (-1,0).

¹² Similar results are found when the control firms are from all countries without change in mandatory interim reporting frequency.

where:

COC = the cost of capital measures in our study. It could be r_{AVG} or $CostDebt$, as defined above.

$EVENT$ = a dummy variable that takes the value of one for countries (firms) that experience change in mandatory interim reporting frequency and zero otherwise.

$AFTER$ = a dummy variable that takes the value of one for years with higher mandatory interim reporting frequency and zero otherwise.

All other variables are defined as above.

The risk factors are borrowed from Model 1 and Model 2. We follow Hail and Leuz (2009) and use either one year or all years before and after the frequency change year, excluding the year of frequency change, as the sample period in Model (3). The coefficient of $EVENT*after$ captures the difference-in-difference effects, i.e., the difference between the cost of capital before and after the change, conditioning on the difference for control firms.

V. Empirical Results

We report our main empirical results in this section. Robust tests are also discussed here.

5.1 Sample information

Table 1 reports sample information. The sample size of cost of equity and cost of debt are provided in the first two columns. The sample size of cost of equity differs from the sample size of cost of debt due to the different data requirement for the calculation. The next three columns provide the mean values of cost of capital and mandatory interim reporting frequency. We provide time-series average cost of capital by country. As shown in Table 1, cost of capital varies considerably across countries. The cost of equity capital ranges from 7.58% in Japan to 18.41% in Columbia. The mean of the cost of equity capital is 12.58%, slightly lower than around 12.97% in Hail and Leuz (2006).

¹³ For cost of debt, its mean is 13.26%, comparable to the mean value of 11.3% in Francis, Khurana and Pereira (2005).¹⁴ The *FREQ* column provides the

¹³ In non-tabulated results, we find that for each country our cost of equity capital is comparable to the cost of equity capital in Hail and Leuz (2006) when focusing on the same countries and sample period. In addition, we also find (unreported) that all of our four implied cost of capital measures are comparable to the results in Hail and Leuz (2006). We find that the model given by Gebhardt et al. (2001) generally yields the lowest estimates, 9.1% in our results. The other three models are fairly close, ranging from about 11% to 14%. Among these four implied cost of capital measures, the Gebhardt et al. (2001) model estimates exhibit the lowest correlations (about 0.4) with the other three proxies, and the other three proxies are highly correlated with each other (the coefficient ranges from 0.6 to 0.9), consistent with Hail and Leuz (2006). The low correlation of r_{GLS} with the other three proxies might be because the model has the longest explicit forecasting horizon (12 years) and incorporates industry information, both of which are not true of the other three models.

¹⁴ The descriptive statistics of our cost of debt measures are very close to Francis, Khurana and Pereira (2005) when we focus on the same sample countries and sample period as Francis, Khurana and Pereira (2005).

time-series average of mandatory interim reporting frequency of countries in our sample. For some countries, this value is a constant—for example, for the United States and Taiwan, whose reporting frequency remains four times per year during our entire sample period. Some of the countries change their mandatory interim reporting frequency. For instance, Singapore increased its reporting frequency from semiannual to quarterly in 2003. Thus, its time-series average of frequency falls between 2 and 4. The mean of the time-series average of frequency is 2.86. The last nine columns provide the (mean) values of the country-specific variables by country, including legal origin (*Common*), disclosure regulation index (*DISREQ*), security regulation index (*SECREQ*), rule of law index (*LAW*), anti-self-dealing index (*ANTSEL*), block premium (*BLOCK*), equity market development (*EMD*), average per capita GDP (*GDPCap*), and the concentration of political power (*AutoC*). They all show considerable variation across countries. We rely on those variables to control for the cross-country differences in the analysis later. To address the concern of influential observations, we winsorize the top and bottom 1% of data for all variables except those country-level variables reported in Table 1.¹⁵

5.2 Descriptive analysis

We first look at the descriptive statistics for the sample used in Table 3. Panel A provides distributional statistics and Panel B provides correlation matrix. As discussed before, cost of capital estimates are comparable with

¹⁵ Our results are not sensitive to the winsorization.

Francis, Khurana and Pereira (2005) and Hail and Leuz (2009). For other variables, the descriptive statistics are generally comparable with previous literature. For example, the mean of leverage is 0.524, close to 0.50 in Francis, Khurana and Pereira (2005) and 0.551 in Hail and Leuz (2009). They generally show considerable cross-sectional variation. In Panel B, we can see that most variables are significantly correlated. Cost of debt is positively correlated with the average implied cost of equity capital (Spearman correlation coefficient is 0.169). All other variables generally display the predicted correlation with our measures of cost of capital. For example, implied cost of equity capital is significantly positively correlated with inflation rate (Pearson correlation coefficient is 0.214) and significantly negatively correlated with firm size (Pearson correlation coefficient is -0.321).

5.3 Cross-sectional regression analysis of the effect of frequency on cost of capital

In this section, we examine the effect of mandatory interim reporting frequency on cost of capital after controlling for firm-specific and country-specific factors in the regression. Since it is unclear in current literature on what risk factors should be controlled in the cost of capital regression, we try various control variable lists to see whether our results are robust to different control variables. Our discussion below is separated into two parts according to whether the dependent variable is cost of equity capital or cost of debt capital.

5.3.1 Regression analysis based on cost of equity model

When cost of equity capital is the dependent variable, we first follow Hail and Leuz (2009) and control for firm size, inflation rate, return variance, leverage and forecast bias in our regression (reported in column M1 in Table 3, Panel A). We find that generally all the risk factors display the predicted signs, consistent with Hail and Leuz (2009). The coefficient on inflation is 0.638, smaller than 1, suggesting that the market is not able to fully anticipate the inflation *ex ante*. Firm size is negatively correlated with our cost of equity capital measures, and return variance, leverage and forecast bias are positively correlated with the measures. After controlling for those five risk factors, the coefficient of our frequency variable is significantly negative, suggesting that higher mandatory interim reporting frequency lowers cost of equity capital. Next, we follow Hail and Leuz (2006) and control for firm size, inflation rate, return variance, book-to-market ratio, EPS variance and forecast bias (reported in column M2 in Table 3, Panel A). Again, all control variables show predicted sign and our frequency variable is significantly negatively correlated with cost of equity capital.

Francis, Khurana and Pereira (2005) control for leverage and accounting performance in their cost of equity capital regressions. Lau et al. (2010) suggest that liquidity and momentum could have impact on cost of capital. Hail and Leuz (2009) use legal tradition, anti-self-dealing index, block premium and equity market development as proxies of legal institutions, which are generally considered having effects on cost of capital. Hail and Leuz (2006) find that

disclosure regulation, security regulation, and rule of law have negative effects on cost of capital and also mentioned in the robust check about additionally controlling for GDP per capital. Bushman et al. (2004) find the concentration of political power is significantly correlated with corporate transparency, which is generally viewed as one factor influencing cost of capital. To be conservative, we additionally control for all those factors beyond Hail and Leuz (2006) in our model.¹⁶ We find that our augmented model explain about 38% of total variance of cost of capital, higher than the previous two models. Control variables generally show the expected signs. After controlling for these known determinants, our frequency variable is significantly negatively correlated with average implied cost of capital at the 1% level (results are reported in the columns M3 in Table 4, Panel A).

One obvious concern for the above results is that a firm might report more frequently than required level. For example, a firm in United Kingdom might report quarterly rather than semiannually as required. Hence, our measure of frequency could be substantially lower than the actual reporting frequency. The difference is the voluntary component of reporting frequency. Without considering such difference will bias against our findings since the lower-than-actual reporting frequency will make it more difficult to find the negative relation with cost of capital. Nevertheless, we address such concern by additionally controlling for voluntary component of reporting frequency, measured as the difference between actual frequency and mandatory frequency,

¹⁶ We get similar results when we include those nine country-specific variables individually into our regressions, for both cost of equity regressions and cost of debt regressions.

in the regression. As shown in column M4 in Table 3, Panel A, we find that our results, if there is any change, become stronger. All other risk factors generally display predicted sign and now the coefficient of frequency is -0.004, significant at 1% level, implying that firms enjoy lower cost of equity capital of about 40 basis points in countries mandating one more time of interim reporting. In another word, firms in countries mandating quarterly reporting have lower cost of equity capital of about 80 basis points compared to firms in countries mandating semiannual reporting, *ceteris paribus*. Our discussions below related to the cost-of-equity-capital regressions are based on the full model controlling for voluntary component of reporting frequency (M4 in Table 3, Panel A).

5.3.2 Regression analysis based on cost of debt model

When cost of debt capital is the dependent variable, we first follow Francis, Khurana and Pereira (2005) and control for firm size, accounting performance, leverage, inflation, bank rate, and investor protection in our regressions (reported in column M1 and column M2 in Table 3, Panel B).¹⁷ We try whether or not control for investor protection in these two models to disentangle the effect of investor protection on cost of debt. Investor protection is proxied by the anti-self-dealing index instead of anti-director index since Djankov et al. (2009) argue that former index is superior to the latter index.

¹⁷ We do not control for a country's financial system structure, as do Francis, Khurana and Pereira (2005), since it measures the degree to which a country's financial system relies on market-oriented equity financing and relatively less on bank-based financing. It might influence the incentive of voluntary disclosures, but not the cost of capital. The inference of our results, however, does not change if we additionally control for it.

Generally, control variables show the predicted signs. For example, the inflation rate and bank rate is significantly positively correlated with cost of debt and the coefficients are as high as 0.6 to 0.7, suggesting that cost of debt is highly dependent on inflation rate and bank rate. We fail to find the significant effect of anti-self-dealing index on cost of debt in this model. After controlling for these factors, we find that reporting frequency is significantly negatively related to cost of debt, suggesting that higher mandatory interim reporting frequency is associated with lower cost of debt capital.

Francis, LaFond, Olsson and Schipper (2005) find that interest coverage and accounting performance variance are correlated with cost of debt, hence we control for those two factors into the cost-of-debt regressions. Similar to the discussion for cost of equity capital, we additionally include other country-specific factors into the regressions to control for the cross-country difference. Results are reported in column M3 in Table 3, Panel B. We find that cost of debt increases with risk proxied by the accounting performance variance. Other variables generally show predicted sign. After controlling for the augmented list of risk factors, mandatory interim reporting frequency is significantly negatively correlated with cost of debt capital. The coefficient of frequency is -0.012, significant at 1% level. To further address the possibility that voluntary component of reporting frequency might confound our results, we additionally include voluntary component of reporting frequency in the regressions. Our results become even stronger and the coefficient of frequency becomes even more negative and is -0.013, significant at 1% level. The results

suggest that mandating one more time of interim reporting could bring an average reduction in the cost of debt capital of about 130 basis points. The full model controls for the cross-country difference and voluntary component of reporting frequency and has the highest R^2 among these four models. To be conservative, our discussions below on cost of debt capital are based on the full model, i.e., M4 in Table 3, Panel B.

To sum up, our results yield findings similar to previous studies for control variables, and after controlling for these variables, we find higher mandatory financial reporting frequency is reliably associated with lower cost of capital, consistent with the argument that mandatory interim reporting frequency reduces cost of capital.

5.4 Sensitivity analyses

Several robust tests are discussed in this section, including robust measures of cost of equity capital, alternatively model specifications, sample restrictions, and results based on country-level sample, etc.

5.4.1 Robust measures of cost of equity capital

We address the sensitivity of our cost of equity capital results over alternative measures. We first report results using estimates from each of four models. Next, we use the first principal component of the four individual estimates as dependent variable, which is a more sophisticated way to reduce idiosyncratic measurement error across the four models than simply averaging.

Then we use proxies for the quality of the cost of capital estimates to compute weights. First, we weight average the four individual estimates based on model fit, i.e., how well the estimates to standard controls for risk and expected returns. We follow Hail and Leuz (2009) and use the risk factor list consisting of firm size, return variability, leverage, and forecast bias. We regress the four individual estimates on the four risk factors by country, and then use the R^2 s from these separate country regressions as weights when averaging across all four models. Second, we use the inverse of the absolute one-year-ahead analyst forecast error as regression weights, giving larger weights to more accurate forecasts. To avoid the potential limits of implied cost of capital measures, we use the dividend yield, measured as last year's actual dividends divided by stock price as of month +10, as another proxy of cost of capital. As reported in Panel A of Table 4, our results for all these refinements are consistent with Table 3 and lead to the same inferences as before. Moreover, the coefficient of frequency has a similar magnitude across models, ranging from 10 to 70 basis points (except for the principal component regression which is on a different scale and cannot be interpreted in terms of basis points). These results demonstrate that our findings do not depend on the choice of a particular cost of capital model or a particular method of aggregation.

5.4.2 Alternative model specifications

We report alternative model specifications here. First, in the cost-of-equity regressions, we alternatively control for growth rate, proxied by

the analyst forecast of short-term growth rate, rather than book-to-market ratio to address the concern that book-to-market ratio might not fully be able to capture the effect of the growth rate. Then, we provide robust tests for both cost-of-equity regressions and cost-of-debt regressions. We first allow for the possibility that real risk-free interest rates differ across countries, reflecting saving rates or interest rate regimes among other things. We replace the control for inflation with a contemporaneous control for the nominal risk-free rate, measured as country-year median of the monthly yields of local treasury bills or, if unavailable, central bank papers, interbank loans, or money market rates (source: Datastream and World Bank). Second, we check whether our results are similar when we use the risk premium as dependent variable, i.e., subtract the local risk-free interest rate from cost of capital, rather than using raw cost of capital estimates together with the local risk-free rate as control in the regression. We prefer the latter approach since it does not force a coefficient of minus one on the proxy for the risk-free interest rate (or inflation rate). Finally, we alternatively control for the first principal component of the nine country-specific variables to address the concern of the multi-collinearity issue among those nine variables. As reported in Panel B of Table 5, our results are generally similar, suggesting that our findings are not sensitive to the above model specifications.

5.4.3 Excluding U.S. and Japanese firms

We check whether our results are mainly driven by observations from

countries with largest sample size, United States and Japan in our sample. We repeat our analysis using the sample excluding U.S. and Japanese firms. As reported in column Panel B of Table 4, our results on frequency are generally similar, implying that our results are not sensitive to excluding observations from the United States or Japan.

5.4.4 Results based on country-level sample

We further address the concern whether our results mainly come from countries with larger sample size by running regressions based on country-level sample, where equal weight is given to each country year and the value of each variable equals to the country-year median of the variable.¹⁸ As reported in column Panel B of Table 4, our results are more or less similar, suggesting that our results are robust in the country-level sample.

5.4.5 Other Issues

There are discussions that the source of cost of capital benefit for mandatory interim reporting frequency might come from managers' more risk-averse behaviors when they are required to report their performance more frequently. The argument provides an alternative channel for the cost of capital

¹⁸ In the cost of equity model, we follow Hail and Leuz (2006) and replace EPS variance with MACVAR, defined as the first principal component of the following four variables: (1) the standard deviation of annual earnings per share over the last five years scaled by total assets per share, (2) the standard deviation of accounting returns on equity over the last five years, (3) the standard deviation of the residuals from a regression of annual gross domestic product (GDP) growth rates on a time index over the sampling period, and (4) the variation of yearly average exchange rates (U.S. dollars to local currency) over the sampling period. As suggested by Hail and Leuz (2006), these firm-level variables likely capture the country-level macroeconomic variability. The first two variables are measured as country-year medians. GDP and exchange rate data come from the International Financial Statistics database.

benefit of reporting frequency, although the mainstream argument is that more frequent reporting could provide more public information to investors and hence lower the information asymmetry and further cost of capital. We include the interaction between frequency (*FREQ*) and return variance (*RETVAR*) in the regression model to examine whether the effect of frequency comes from the lower level of risk of projects and fail to find the significant coefficient on the interaction.

There are also concerns that voluntary disclosure might confound our results. Although we already partially take care of such confounding effect by controlling for voluntary component of reporting frequency, it still leaves open the possibility that other types of voluntary disclosure could confound our results. However, so far there is no theory or evidence suggesting that voluntary disclosure is positively correlated with mandatory disclosure. By contrast, there are some studies arguing that mandatory disclosure will substitute for or crowd out voluntary disclosure, such as Gigler and Hemmer (1998). So, the possibility more likely biases again our findings, as already documented in the case of voluntary component of reporting frequency.

There are also discussions about the endogeneity problem with our study. However, we think mandatory disclosure constitutes a commitment to disclosure and is exogenous shock to an individual firm and hence studies of mandatory interim reporting frequency are unlikely subject to self-selection problem appeared in studies of voluntary disclosure (Hail and Leuz, 2006). This also comprises the unique advantage of our research setting for investigating the

effect of disclosures.

5.5 Difference-in-differences analysis

In this section, we focus only on firms in countries with change in mandatory interim reporting frequency. In our sample, we have 9 countries that experience increases in mandatory interim reporting frequency, including increases from annual to semiannual, and semiannual to quarterly, as shown in Panel A of Table 5.¹⁹ Two countries change their requirement on interim reporting frequency twice in our sample period including China and Portugal. China increases the frequency from annual to semiannual in 1994 and from semiannual to quarterly in 2001. Portugal mandates semiannual reporting in 1991 and quarterly reporting in 1999. Another seven countries change the interim reporting requirement once, i.e., from semiannual to quarterly. Greece and India institutes the quarterly reporting requirement in 1998, Korea, Malaysia, and Norway do that in 1999, and Pakistan and Singapore change it in 2003.

We follow Daske et al. (2008) and employ difference-in-differences analysis approach. We first use the univariate difference-in-differences design to examine the effect of the change in the regulation of financial reporting frequency on cost of capital, including the average implied cost of capital measure and cost of debt capital.²⁰ Our time window is (-1,+1) (i.e., the year

¹⁹ Other countries with increases in mandatory interim reporting frequency are not included since we are not able to identify the year of change due to information limitation.

²⁰ People suggest that our results might be confounded by the possibility that firms will exit from listing

before the change and the year after the change). Year 0 is the event year when frequency change occurs. We focus on the changes in cost of capital for observations whose reporting frequency experiences increases.

The results on univariate difference-in-differences analysis are reported in Table 5, Panel B. We find that average implied cost of capital decreases by 1.5% on average, significant at the 1% level. However, the matched control firms also experience significant decreases of 0.9% in cost of equity capital and finally the mean adjusted decrease is only 0.6% and it is insignificant, although close to traditional significant level 10%. The change in cost of debt is insignificant, either adjusted or unadjusted by time-series change. To summarize, the results suggest that increases in reporting frequency reduce cost of equity capital and the results for cost of debt capital are insignificant.

The difference-in-differences design does not control for concurrent changes in other risk factors such as inflation rate, which might account for the large decrease in cost of equity capital. To alleviate such concern, we control for other risk factors in the full model of Table 3. In addition, we include control firms in the regression and use *EVENT* dummy to distinguish these two categories of firms to control for the time-series change in cost of capital and other unobservable effects on cost of capital. We follow Hail and Leuz (2009) and include either year -1/+1 only (to examine the short-term effect of frequency change on cost of capital) or all years except year 0 around frequency

if those firms expect smaller or no cost of capital benefit. However, our data shows that the sample size increases over time around the regulation of frequency increase and suggests such possibility is unlikely the case.

change (to examine the long-term cumulative effect of frequency change on cost of capital) into our regressions. We use *AFTER* dummy to identify the sample period after the change in frequency. The focus is the interaction between *EVENT* dummy and *AFTER* dummy, which is used to capture the difference-in-differences effects after controlling for other risk factors. Results are reported in Table 6, Panel B.

As shown in the Panel C of Table 5, our risk factors generally display predicted signs. For example, firm size is negatively associated with cost of capital measures. Consistent with findings in the cross-sectional regression analysis, the coefficients on the interaction between *EVENT* dummy and *AFTER* dummy are negative, although the results are slightly stronger when all years except year 0 are included in the sample compared to results based on the sample including year -1/+1 only. In the former-sample results, the coefficients of the interaction between *EVENT* dummy and *AFTER* dummy are significantly negative. The results imply that when a country increases its mandatory interim reporting frequency from seminal reporting to quarterly reporting, cost of equity capital decreases by about 110 basis points and cost of debt capital decreases by about 450 basis points, after controlling for other known determinants. The larger magnitude of the coefficient of frequency might be due to the fact that it captures the effect of increases of several times of mandatory interim reporting, such as two times for increases from semiannual to quarterly. The inferences from results based on sample of year -1/+1 are weaker but largely similar.

Taken together, the difference-in-differences analysis results confirm

that the mandatory increase in reporting frequency reduces the cost of capital, including both cost of equity capital and debt capital.

5.6 Does more frequent interim reporting provide more information?

There is argument that more frequent interim reporting might not provide more information but simply spread the same amount of information into more pieces. If it is true, then the benefit of more frequent interim reporting is in doubt. To answer this question, we use Ball and Shivakumar's (2008) abnormal R^2 to measure the information content of earnings announcements. To be specific, we calculate the adjusted R^2 from a regression of calendar-year returns on returns in each of the three-day announcement "event window" during the year. The number of announcement depends on the interim reporting frequency. We estimate pool regressions of calendar-year returns (R_{annual}) on returns in the annual (or semiannual or quarterly) earnings-announcement windows ($R_{\text{window } i}$) during the calendar year:

$$R_{\text{annual}} = \alpha_0 + \sum \alpha_i R_{\text{window } i} + \varepsilon \quad (4)$$

i = the number of interim reporting. It could be 1, 2, or 4.

The regression adjusted R^2 measures the proportion of annual return variability associated with the earnings event windows. We then further calculate the abnormal R^2 as the difference of adjusted R^2 and its expectation assuming i.i.d. daily returns, i.e., the percentage of the number of trading days in all announcement periods (3 for annual reporting, 6 for semiannual reporting and 12 for quarterly reporting) over the average number of trading days in the

calendar year.

The results are reported in Table 6. For the full sample, the results in Panel A indicate that quarterly reporters' announcement-window returns explain a largest portion of the variance in annual returns, followed by three-time reporters and semiannual reporters, and annual reporters' announcement-window returns explain the least portion among the four types of reporters.²¹ In particular, the value of the Ball and Shivakumar's (2008) abnormal R^2 measure for quarterly reporters is about 1.3 times as high as the value of semiannual reporters in the full sample (10.87 percent versus 8.60 percent). The value of abnormal R^2 we estimate for quarterly reporters around the world in the period 1989-2007 (10.87 percent) is slightly higher than the value of abnormal R^2 estimated by Ball and Shivakumar (2008) for quarterly reporters in U.S. in the period 1990-2006 (9.9 percent), which might be due to higher level of importance of earnings announcements in other countries than that in the U.S. where information from intermediates (e.g., analyst forecast) and voluntary disclosure is more abundant. When we look at the event sample that increase their requirement on interim reporting frequency, we find that the value of the Ball and Shivakumar's (2008) abnormal R^2 measure increases from 7.84% to 10.73%, increases 2.89%, or 0.4 times of original abnormal R^2 when mandatory interim reporting frequency increases, as reported in Panel B. The results suggest that more frequent reporting does not just disclose the same amount of information in more pieces but rather provide more information to the market,

²¹ The existence of three-time reporters is mainly because the mandatory interim reporting frequency increases from semiannual to quarterly in the middle of the calendar year.

lending support to the argument that the amount of information increases with the mandatory interim reporting frequency.

VI. Cross-sectional Differences by Legal Institutions

In this section, we examine whether the cost of capital effect of mandatory interim reporting frequency differs by legal institutions. To test this argument, we partition the sample into subsamples by legal institution proxies, run separate regressions for each subsample and then test the difference between the results based on the subsamples.²² The regression models are Model 1 and Model 2 for cost of equity and cost of debt, respectively. We use the following partitioning variables: (1) regulation of self-dealing is equal to high for countries with above-median values of the anti-self-dealing index representing the legal protection of minority shareholders against expropriation by controlling insiders, (2) countries are selected into two groups depending on their legal tradition, (3) disclosure regulation is set equal to high for countries with above-median index values of disclosure requirements in securities offerings, (4) security regulation that is set to be high for countries with above-median values of the security regulation index, (5) legal environment that is high for countries with above-median values of the overall quality of legal system, (6) insiders' private control benefits are assumed to be low in countries with below-median average block premiums paid in corporate control transactions, and (7) equity market development is set equal to high for countries with above-median percentage ranks averaging across three market development variables (i.e., the ratio of the aggregate stock market

²² For the significance test of the differences across partitions, we additionally include the partition dummy as well as the interactions between the partition dummy and all variables in Model 1 (or 2) and use the coefficient of the interaction between the partition dummy and mandatory interim reporting frequency variable to test the differential effect of the partition variable.

capitalization held by minorities to gross national product, the number of listed domestic firms per capita, and the number of initial public offerings per capita). Legal institutions are assumed to be high in countries with high anti-self-dealing index, common-law legal tradition, high disclosure regulation index, high security regulation index, high level of legal environment, low private benefits of control, and more developed equity market. With all these proxies, we attempt to capture the extent to which legal institutions protect outside investors and to examine the differences in the cost-of-capital benefits of mandatory interim reporting frequency by legal institutions.

Table 7 provides the statistics of our frequency variable (coefficient estimates, t-statistics, and significance tests), the regression information including adjusted R^2 and sample size across subsamples, and the statistics about the difference of the coefficients of frequency between subsamples (coefficient estimates, t-statistics, and significance tests). Our unreported results show that the control variables generally behave as predicted and are highly significant, as in Table 3. We omit the statistics of control variables for the sake of brevity.

When cost of equity capital is the dependent variable, the coefficient on frequency is negative and highly significant for firms from countries with high anti-self-dealing regulation, common-law origin, high disclosure requirements, high security regulation, high level of legal environment, low block premiums and more developed capital markets. The effects of frequency are insignificant in countries with low anti-self-dealing regulation, low disclosure requirements,

low level of legal environment and less developed capital markets and significantly positive in countries with code law origins, low security regulation and high block premiums, suggesting that more frequent mandatory reporting does not bring cost of capital benefits in countries with weak legal institutions and sometimes could have opposite effects when information asymmetry is widened due to more disclosure of poor-quality information in those countries. All differences between the subsamples are significant.

When examining the cost of debt effect of frequency, we find that the effects are significantly negative in countries with high anti-self-dealing regulation, common-law origin, high disclosure regulation, high security regulation, low block premiums and more developed capital markets. Also, we find that the effects of frequency are insignificant in countries with low disclosure requirements and less developed capital markets and significantly positive in countries with low anti-self-dealing regulation, code law origins, low security regulation and high block premiums, confirming that more frequent mandatory reporting does not bring cost of capital benefits in countries with weak legal institutions and could even have opposite effects when information asymmetry problem is aggravated. The differences between the subsamples are significant. The effects in countries with either high or low level of legal environment are significant and the difference between them is insignificant, however.

Taken together, we find that generally strong legal institutions can intensify the effect of mandatory interim reporting frequency and the effect of frequency

on cost of capital is stronger in countries with stronger legal institutions.

VII. Conclusion

We examine whether higher mandatory interim reporting frequency is associated with lower cost of capital in an international setting. Existing theoretical and empirical evidence does not provide clear answer to this question. On the one hand, the amount of information might increase as the increase in mandatory interim financial reporting, and therefore information asymmetry and the cost of capital are reduced. On the other hand, financial intermediaries' incentives to gather information and firms' propensity to issue voluntary disclosures might decrease as the increase in mandatory reporting frequency (Gigler and Hemmer, 1998; Einhorn, 2005), resulting in a reduction in total information available to investors. Furthermore, it's unclear whether more aggregate information leads to a reduction in cost of capital.

We estimate the cost of capital for 66,863 firm-year observations over the period from 1989 to 2007 and investigate the relation between mandatory financial reporting frequency and cost of capital. Consistent with the beneficial view, we find that mandatory interim reporting frequency is consistently associated with lower cost of capital, especially in countries with stronger legal institutions, and the cost of capital decreases after the mandatory increase of mandatory interim reporting frequency. The results are robust over various ways of controlling for risk factors. Overall, our evidence strongly suggests that the mandatory increase in financial reporting frequency does reduce cost of capital. Our empirical evidence sheds lights on the important question whether or not mandatory disclosures have cost of capital benefits, and have policy

implications for international accounting standard board and regulators in economies such as Hong Kong considering increasing mandatory interim reporting frequency.

However, our results should be interpreted with caution. First, our difference-in-difference analysis results are contaminated by the uncontrolled concurrent changes in institutional environment (for example, changes with respect to governance and auditing, which apply to all firms in the economy). These concurrent changes could potentially drive the cost of capital effects, although we believe this should not be the main concern, since our cross-sectional results support the cost-of-capital-benefit view and are unlikely affected by such a possibility. Second, we only document the cost-of-capital benefit of mandatory interim reporting frequency, but we do not suggest that quarterly disclosure is better than semiannual disclosure. There are numerous other characteristics that are not explored in this study: for example, out-of-pocket cost and proprietary cost associated with disclosures. It is possible that those costs negate the cost-of-capital benefits on firm valuation. Finally, our results are subject to the caveats of measurement error in cost of capital, and our evidence may be contaminated by sampling bias, since the data requirement for cost of equity capital screens out lesser-known firms without analyst coverage.

APPENDIX I

Procedures Used to Collect Frequency Sample²³

1. Search the Web sites of security exchanges and regulators for words including "interim", "quarterly", "semiannual", "half-year", "disclosure regulation", "listing requirement", "security law", "financial report", etc. at the following URL:
http://www.mondovisione.com/index.cfm?section=regulatorsweb&sh=28&first_letter=B. Try to find regulations or laws on financial reporting frequency in country we of year t.
2. Search www.google.com for the country name plus "interim reporting frequency" or "quarterly report" or "semiannual report" or "disclosure regulation" or "listing rules" or "security law."
3. If not enough data is found, check the Factiva database. Search the listed firms in CIFAR (1993). To be specific, search 10 to 20 leading companies in each country: for a large industrial country, search 20 firms, and for a small industrial country, search 10 firms. The minimum reporting frequency is taken as the mandatory frequency in the country.

A missing value is treated if the frequency can't be identified through CIFAR (1989, 1991, 1993, and 1995) and the sources mentioned above.

²³ Complemented from CIFAR (1993) with changes.

APPENDIX II

Models Used to Estimate the Implied Cost of Equity Capital²⁴

The following definitions are common to the four models. Specific assumptions and modifications to these variables are described with the model.

P_t = market price of a firm's stock at date t as reported in I/B/E/S.

BPS_t = book value per share at the beginning of the fiscal year.

$FBPS_{t+i}$ = expected future book value per share at year t+i, where

$$FBPS_{t+i} = FBPS_{t+i-1} + FEPS_{t+i} - FDPS_{t+i}.$$

DPS_0 = dividends per share paid during year t-1.

$FDPS_{t+i}$ = expected future net dividends per share for period (t+i-1, t+i),

derived from the expected dividend payout ratio times the forecasted earnings per share $FEPS_{t+i}$.

k = expected dividend payout ratio, calculated as the historic three-year average for each firm. If k_t is missing or outside the range of zero and one, it is replaced by the country-year median payout ratio.

$FEPS_{t+i}$ = expected future earnings per share for year t+i. $FEPS_1$ and $FEPS_2$ are equal to the one- and two-year-ahead consensus EPS forecasts reported in I/B/E/S. $FEPS_3$ is equal to the three-year-ahead consensus EPS forecast when available and $FEPS_2(1 + g_{it})$ when not available.

g = perpetual growth in abnormal earnings, equal to the expected inflation.

²⁴ Modified from Hail and Leuz (2006) and Dhaliwal et al. (2006) with changes.

As a proxy for g , we use the annualized median of country-specific, one-year-ahead realized annual inflation rates. Note that g sets a lower bound to the cost of capital estimates. We replace it with the annualized country-specific median of one-year-ahead realized inflation rates over the entire sample period when inflation rate is negative.

g_{st} = expected short-term future growth rate; equal to $FEPS_{t+2} / FEPS_{t+1} - 1$.

g_{lt} = expected long-term future growth rate, equal to the consensus EPS long-term growth rate provided by financial analysts on I/B/E/S.

$r_{GLS}, r_{CT}, r_{GM}, r_{PEG}$ = implied cost of capital estimate calculated as the internal rate of return solving the above valuation equations, respectively. Implied cost of equity capital estimates are restricted to be positive and set to missing otherwise.

1) Gebhardt, Lee, and Swaminathan (2001)

$$P_t = BPS_t + \frac{FROE_{t+1} - r_{GLS}}{(1 + r_{GLS})} BPS_t + \frac{FROE_{t+2} - r_{GLS}}{(1 + r_{GLS})^2} FBPS_{t+1} + \frac{FROE_{t+3} - r_{GLS}}{(1 + r_{GLS})^3} FBPS_{t+2} + TV$$

$$TV = \sum_{i=4}^{T-1} \frac{FROE_{t+i} - r_{GLS}}{(1 + r_{GLS})^i} FBPS_{t+i-1} + \frac{FROE_{x+T} - r_{GLS}}{r_{GLS} (1 + r_{GLS})^{T-1}} FBPS_{t+T-1}$$

where

$FROE_{t+i}$ = forecasted return on equity (ROE) for period $t+i$. For years

one through three, this variable is equal to $FEPS_{t+i} / B_{t+i-1}$. Beyond year three, $FROE_{t+i}$ is a linear interpolation to the sector-specific median ROE. We compute the historic three-year average return on equity in a given country and year for the sectors as defined in I/B/E/S. Negative sector-specific target returns are replaced by country-year medians. From T=12 on residual income is assumed to remain constant.

$$FBPS_{t+i} = FBPS_{t+i-1} + FEPS_{t+i}(1-k)$$

T = forecast horizon. T=12.

2) Claus and Thomas (2001)

$$P_t = BPS_t + \sum_{i=1}^5 \frac{ae_i}{(1+r_{CT})^i} + \frac{ae_5(1+g)}{(r_{CT}-g)(1+r_{CT})^5}$$

where

ae_{t+i} = abnormal earnings calculated as $FEPS_{t+i} - r_{CT}FBPS_t$. For year +3, +4, and +5, $FEPS_{t+i}$ is equal to the consensus forecast for that year, if available; otherwise, $FEPS_{t+i} = FEPS_{t+i}(1+g_t)$.

3) Gode and Mohanram (2003)

$$r_{GM} = A + \sqrt{A^2 + \left(\frac{FEPS_{t+1}}{P_t}\right)(g_2 - g)}$$

where

$$A = 0.5 \left(g + \frac{FDPS_{t+1}}{P_t} \right)$$

and

g_2 = short-term growth rate defined as $(g_{st} + g_{lt})/2$.

$$FDPS_{t+1} = DPS_0$$

Note: The model requires a positive change in forecasted earnings to yield a numerical solution.

4) Modified price-earnings growth (PEG) ratio model by Easton (2004)

$$P_t = (FEPS_{t+2} + r_{PEG} \cdot FDPS_{t+1} - FEPS_{t+1}) / r_{PEG}^2$$

$$FDPS_{t+1} = DPS_0$$

Note: This model requires $FEPS_{t+2} \geq FEPS_{t+1} > 0$

For an observation to be included in the sample using cost of equity capital measures, the following variables are required non-missing: current stock price data (P_t), analyst earnings per share forecasts for two periods ahead ($FEPS_{t+1}$ and $FEPS_{t+2}$), and either forecasted earnings per share for period $t+3$ ($FEPS_{t+3}$) or an estimate of long-term earnings growth (g_{lt}) are required available. Such information can be available from the I/B/E/S database. If explicit earnings per share forecasts for the periods $t+3$ through $t+5$ are missing, the relation $FEPS_{t+i} = FEPS_{t+i-1} \cdot (1 + g_{lt})$ is applied. Alternatively, if g_{lt} are missing, we impute g_{lt} from the percentage change in forecasted earnings per

share between periods $t+2$ and $t+3$. Only positive earnings forecasts and growth rates are used. All estimates are mean analyst consensus forecasts.

Stock prices and analyst forecasts are measured as of month +10 after the end of the fiscal year. This time lag is chosen to ensure that financial data, especially earnings and book values of equity, are publicly available and impounded in prices at the time we compute the cost of capital estimate. However, this implies that the one-year-ahead forecast ($FEPS_{t+1}$) is for a fiscal year that ends just two months later.

APPENDIX III

Variable Definition

Variable	Definition
Average implied cost of equity (r_{AVG})	The mean of the four estimates for the implied cost of equity capital as described in Appendix II.
Mandatory interim reporting frequency ($Freq$)	Interim reporting frequency mandated in a country, ranging from 1 to 4.
Voluntary component of interim reporting frequency ($VolFreq$)	The voluntary component of interim reporting frequency, equal to the difference between actual frequency from I/B/E/S database and mandatory frequency.
Firm size ($Size$)	The natural log of a firm's market capitalization in dollars at the beginning of the calendar year.
Return on assets (ROA)	Net income divided by total assets.
Leverage ratio (LEV)	The ratio of short- and long-term debt to total assets.
Return variance ($RETVAR$)	The standard deviation of daily stock returns over the last 12 months.
Book-to-market ratio (BMR)	The ratio of book value to market value of equity at the beginning of the calendar year.
Earnings variance ($EPSVAR$)	A firm's standard deviation of annual earnings per share over last five years scaled by month +10 price.
Turnover ($TURN$)	The mean monthly trading volume over the prior 12 months divided by the number of shares outstanding.
Momentum ($LAGRET$)	The accumulated return in the past 12 months.

Forecast bias (<i>FBIAS</i>)	The mean one-year-ahead consensus forecast minus the actual earnings reported in I/B/E/S.
Inflation (<i>INFL</i>)	Yearly median of country-specific, one-year-ahead realized monthly inflation rates. Inflation data are provided by the Datastream database.
Anti-self-dealing index (<i>ANTSEL</i>)	The anti-self-dealing index representing the legal protection of minority shareholders against expropriation by controlling insiders (Djankov et al., 2008).
Legal tradition (<i>Common</i>)	The common law/code law dummies (La Porta et al., 1997)
Disclosure regulation index (<i>DISREG</i>)	The disclosure regulation index measuring the level of disclosure regulation based on an index of disclosure requirements in securities offerings (Hail and Leuz, 2006).
Securities regulation index (<i>SECREG</i>)	The securities regulation index capturing the effectiveness of a country's securities regulation by combining the disclosure requirements index with the liability standard and the public enforcement indices (Hail and Leuz, 2006).
Rule of law index (<i>LAW</i>)	The rule of law index representing the general quality of the legal environment (Hail and Leuz, 2006).
Block premium (<i>BLOCK</i>)	The block premiums paid in transactions involving corporate controls measuring the private benefit of control (Dyck and Zingales, 2004).
Equity market development (<i>ΔEMD</i>)	The measure of equity market development equal to the average percentage rank across the three La Porta et al. (1997) variables (i) ratio of the aggregate stock market capitalization held by minorities to gross national product, (ii) number of listed domestic firms relative to the population, and (iii) number of IPOs relative to the population. Again, no sign is expected.
GDP per capital (<i>GDPCap</i>)	A country's per capita GDP in 100,000 US dollars, reflecting the level of wealth of a country.
Autocracy (<i>AutoC</i>)	The concentration of political power equal to the average of autocracy index between 1960 and 1994 (Bushman et al., 2004).
Industry dummy (<i>INDUSTRY</i>)	Following DeFond et al. (2007), we use I/B/E/S sector data, which includes 11 sectors: finance, health care, consumer non-durables, consumer services, consumer durables, energy, transportation, technology, basic

industries, capital goods, and public utilities.

Cost of debt (<i>CostDebt</i>)		The interest expense for the year divided by average short- and long-term debt during the year.
Bank rate (<i>RATE</i>)		The country-specific bank rate that applies to the short- and medium-term financing needs of the private sector, normally differentiated according to creditworthiness of borrowers and objectives of financing. The data are from IMF/International Financial Statistics database.
The accounting performance variance ($\sigma(NIBE)$)		The standard deviation of the net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period. We require at least five observations of NIBE to calculate the standard deviation (Francis, LaFond, Olsson and Schipper, 2005).
Interest coverage (<i>IntCov</i>)	ratio	The ratio of operating income to interest expense (Francis, LaFond, Olsson and Schipper, 2005).
Abnormal (R^2)	R^2	The R^2 in a regression of twelve-month returns on a set of one (for annual reporters), two (for semiannual reporters), three (for firms reporting three times) or four (for quarterly reporters) announcement window returns, adjusted for the expected R^2 . The announcement windows are the three-day intervals around the interim and annual earnings announcement dates. The expected R^2 is equal to 3 (6, 9 or 12) divided by the average number of trading days per year for annual (semiannual, three-time, or quarterly) reporters.

REFERENCES

- Alford, A., J. Jones, R. Leftwich and M. Zmijewski. 1993. The Relative Informativeness of Accounting Disclosures in Different Countries. *Journal of Accounting Research* 31: 183-223.
- Ball, R. and L. Shivakumar. 2008. How Much New Information is There in Earnings? *Journal of Accounting Research* 46: 975-1016.
- Ball, R, L. Hail and F. Vasvari. 2009. Equity Cross-Listings in the U.S. and the Price of Debt. Working paper, University of Chicago, University of Pennsylvania and London Business School.
- Bekaert, G., and C. Harvey. 1995. Time-Varying World Market Integration. *The Journal of Finance* 50 : 403–44.
- Botosan, C. 1997. Disclosure Level and the Cost of Equity Capital. *The Accounting Review* 72:323-49.
- Bushee, B., and C. Leuz. 2005. Economic Consequences of SEC Disclosure Regulation: Evidence from the OTC Bulletin Board. *Journal of Accounting and Economics* 39:233-264.
- Bushman, R., J. Piotroski and A. Smith. 2004. What Determine Corporate Transparency? *Journal of Accounting Research* 42:207-52.
- Butler, M., A. Kraft and I. Weiss. 2007. The Effect of Reporting Frequency on the Timeliness of Earnings: The Cases of Voluntary and Mandatory Interim Reports. *Journal of Accounting and Economics* 44:181-217.
- Center for International Financial Analysis & Research. 1989-1995. International Accounting and Auditing Trends. CIFAR Publications, Inc.,

- Princeton, NJ.
- Claus, J., and J. Thomas. 2001. Equity Premia as Low as Three Percent? Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets. *Journal of Finance* 56: 1629–66.
- Coles, J., U. Loewenstein and J. Suay, 1995, On Equilibrium Pricing Under Parameter Uncertainty. *Journal of Financial and Quantitative Analysis* 30: 347-74.
- Cuijpers, R., and E. Peek. 2010. Reporting Frequency, Information Precision and Private Information Acquisition. *Journal of Business Finance & Accounting* 37: 27-59.
- Daske, H., L. Hail, C. Leuz, and R. Verdi. 2008. Mandatory IFRS Reporting Around the World: Early Evidence on the Economic Consequences. *Journal of Accounting Research* 46: 1085-1142.
- DeFond, M., Hung, M. Y., Trezevant, R. H. 2007. Investor Protection and the Information Content of Annual Earnings Announcements: International Evidence. *Journal of Accounting and Economics* 43:37-67.
- Dhaliwal, D., S. Heitzman and O. Li. 2006. Taxes, Leverage and the Cost of Equity Capital. *Journal of Accounting Research*. 44 (4): 691-723.
- Djankov, S., and R. La Porta, F. Lopez de Silanes, and A. Shleifer. 2008. The Law and Economics of Self-Dealing. *Journal of Financial Economy* 88:430-65.
- Dyck, A., and L. Zingales. 2004. Private Benefits of Control: an International Comparison. *Journal of Finance* 59:537-600.

- Easton, P. 2004. PE Ratios, PEG Ratios, and Estimating the Implied Expected Rate of Return on Equity Capital. *The Accounting Review* 79: 73–95.
- Easton, P. and S. Monahan. 2005. An Evaluation of Accounting-Based Measures of Expected Returns. *The Accounting Review* 80: 501–38.
- Einhorn, E., 2005. The nature of the interaction between mandatory and voluntary disclosures. *Journal of Accounting Research* 43, 493–621.
- Elliott, R., 2000. Hearing on Adapting a 1930s Financial Reporting Model to the 21st Century. Testimony Before Senate Banking Committee: Subcommittee on Securities.
- Engel, E., R. Hayes, and X. Wang. 2007. The Sarbanes-Oxley Act and Firms' Going-Private Decisions. *Journal of Accounting and Economics* forthcoming.
- Errunza, V. and D. Miller. 2000. Market Segmentation and the Cost of Capital in International Equity Markets. *Journal of Financial and Quantitative Analysis* 35: 577–600.
- Fama, E. and K. French. 1992. The Cross-Section of Expected Stock Returns. *Journal of Finance* 47: 427–65.
- Fama E. and K. French. 1997. Industry Costs of Equity. *Journal of Financial Economics* 43:153-94.
- Ferrell, A. 2003. Mandated Disclosure and Stock Returns: Evidence from the Over-The-Counter Market. Working Paper, Harvard Law School.
- Financial Times (November 29, 2003). Brussels Gives Quarter on Data Frequency. p.10.

- Fu, R., A. Kraft and H. Zhang. 2010. Financial Reporting, Information Asymmetry and the Cost of Equity: the Effects of Changes in Interim Reporting Frequency. Working paper, Erasmus University, City University London, and Nanyang Technological University.
- Francis, J., I. Khurana, and R. Pereira. 2005a. Disclosure Incentives and Effects on Cost of Capital Around the World. *The Accounting Review* 80(3):1125-62.
- Francis, J., R. LaFond, P. Olsson, and K. Schipper. 2005b. The Market Pricing of Accruals Quality. *Journal of Accounting and Economics* 39:295-327.
- Gebhardt, W., C. Lee, and B. Swaminathan. 2001. Toward an Implied Cost of Capital. *Journal of Accounting Research* 39: 135–76.
- Gigler, F. and T. Hemmer. 1998. On the frequency, quality, and informational role of mandatory financial reports. *Journal of Accounting Research* 36:117-47.
- Gode, D., and P. Mohanpam. 2003. Inferring the Cost of Capital Using the Ohlson-Juettner Model. *Review of Accounting Studies* 8 (2003): 399–431.
- Guay, W., S. P. Kothari, and S. Shu. 2005. Properties of Implied Cost of Capital Using Analysts' Forecasts. Working paper, The Wharton School, MIT, and Boston College.
- Hail, L. and C. Leuz. 2006. International Difference in the Cost of Equity Capital: Do Legal Institutions and Securities Regulation Matter? *Journal of Accounting Research* 44: 485-531.
- Hail, L. and C. Leuz. 2009. Cost of Capital Effects and Changes in Growth

- Expectations around U.S. Cross-listings. *Journal of Financial Economics* 93:428-54.
- Hart, O. 1995. Firms, contracts, and financial structure. Clarendon Press, Oxford.
- Jain, P., J. Kin, and Z. Razaee. 2004. Trends and Determinants of Market Liquidity in the Pre- and Post-Sarbanes-Oxley Act Periods. Working Paper, University of Memphis.
- Joos, P., and M. Lang. 1994. The Effects of Accounting Diversity: Evidence from the European Union. *Journal of Accounting Research* 32: 141-68.
- Jopson, B. 2006. Big Four in Call for Real-Time Accounts. *Financial Times* Nov. 8.
- La Porta, R., F. Lopez-de-Silanes, A. Schleifer, and R. Vishny. 1997. Legal Determinants of External Finance. *Journal of Finance* 52:1131-50.
- La Porta, R., F. Lopez-de-Silanes and A. Schleifer. 2006. What Works in Securities Laws? *The Journal of Finance* 61:1-32.
- Lau, S., L. Ng and B. Zhang. 2010. The World Price of Home Bias. *Journal of Financial Economics* forthcoming.
- Leftwich, R., Watts, R., Zimmerman, J.. 1981. Voluntary Corporate Disclosure: the Case of Interim Reporting. *Journal of Accounting Research* 19:50-77.
- Leuz, C., D. Nanda and P. Wysocki. 2003. Earnings Management and Investor Protection: an International Comparison. *Journal of Financial Economics* 69: 505-27.
- Leuz, C., A. Triantis and T. Wang. 2008. Why Do Firms Go Dark? Causes and

- Economic Consequences of Voluntary SEC Deregistrations. *Journal of Accounting and Economics* 45: 181-208.
- McNichols, M., and G. Manegold. 1983. The Effect of the Information Environment on the Relationship Between Financial Disclosure and Security Price Variability. *Journal of Accounting and Economics* 5: 49-74
- Sengupta, P. 1998. Corporate Disclosure Quality and the Cost of Debt. *The Accounting Review* 73: 459-74.
- Ulbricht, N. and C. Weiner. 2005. Worldscope Meets Compustat: A Comparison of Financial Databases. Working Paper. University of Mannheim and Humboldt University of Berlin.
- Verrecchia, R. 2001. Essays on Disclosure. *Journal of Accounting and Economics* 32: 97-180.
- Yiu, E. 2009. Compromise Offered in Quarterly Reporting Now. *Business*. August 3rd.
- Zhou, X., 2001. Understanding the Determinants of Managerial Ownership and the Link between Ownership and Performance: Comment. *Journal of Financial Economics* 62(3):559-71.

TABLE 1
Sample Information, Cost of Capital Estimates, Frequency and Country Characteristics by Country

Country	Firm-Years		r_{AVG}	Cost Debt	FREQ	ANT SEL	Com mon	DIS REQ	SEC REG	LAW	BLO CK	EMD	GDP Cap	Aut oC
	r_{AVG}	CostDebt												
Argentina	18	81	12.66%	11.88%	1	0.34	0	0.5	0.43	0.54	0.27	7.83	.	4.23
Australia	911	2,299	11.16%	14.59%	2	0.76	1	0.75	0.77	1	0.02	.	0.27	0
Austria	101	270	10.80%	12.41%	2.49	0.21	0	0.25	0.18	1	0.38	11.33	0.11	0
Belgium	278	411	11.06%	10.40%	2.58	0.54	0	0.42	0.34	1	.	16.33	0.11	0
Brazil	79	153	17.80%	45.55%	4	0.27	0	0.25	0.39	0.63	0.65	6.83	0.04	4.26
Canada	199	1,146	10.12%	10.94%	4	0.64	1	0.92	0.91	1	0.01	31.67	0.26	0
Chile	31	37	13.38%	24.42%	3.99	0.63	0	0.58	0.5	0.7	0.18	27	.	3.03
China	218	1,188	11.51%	6.50%	3.41	0.76	0	.	.	.	.	.	0.00	7.63
Colombia	4	25	18.41%	22.51%	1	0.57	0	0.42	0.37	0.21	0.27	6.67	.	0
Denmark	273	393	11.19%	10.90%	2	0.46	0	0.58	0.5	1	0.08	26.83	0.35	0
Finland	276	498	12.40%	10.62%	3.55	0.46	0	0.5	0.49	1	0.02	20.17	0.13	0
France	1,148	2,012	10.85%	9.45%	3.30	0.38	0	0.75	0.58	0.9	0.02	14.33	0.11	0.26
Germany	517	1,716	11.05%	19.34%	3.49	0.28	0	0.42	0.21	0.92	0.1	8.67	0.17	0
Greece	106	294	11.94%	11.30%	3.15	0.22	0	0.33	0.38	0.62	.	16.33	0.05	2.06
Hong Kong	598	539	13.60%	9.09%	2	0.96	1	0.92	0.81	0.82	0	38.17	0.25	.
India	263	439	13.79%	17.69%	3.52	0.58	1	0.92	0.75	0.42	.	21	0.01	0
Ireland	129	198	12.02%	9.83%	2	0.79	1	0.67	0.49	0.78	.	24.83	0.31	0
Israel	25	73	11.05%	12.87%	4	0.73	1	0.67	0.65	0.48	0.27	30	.	0
Italy	406	731	10.39%	11.43%	3.36	0.42	0	0.67	0.46	0.83	0.37	10.17	0.08	0
Japan	2,831	15,500	7.58%	4.41%	2	0.5	0	0.75	0.47	0.9	.	24.17	0.33	0
Korea, South	151	1,076	15.22%	9.83%	3.17	0.47	0	0.75	0.55	0.54	0.16	17.33	0.12	4.71
Luxembourg	17	11	9.78%	9.88%	1	0.28	.	.	.	.	.	.	.	0
Malaysia	606	1,251	11.78%	10.00%	2.98	0.95	1	0.92	0.78	0.68	0.07	34.33	0.03	0.26
Mexico	91	122	13.45%	11.47%	4	0.17	0	0.58	0.35	0.54	0.34	7.5	0.02	5.03
Netherlands	441	515	12.44%	11.63%	2	0.2	0	0.5	0.62	1	0.02	27.5	0.16	0
New Zealand	196	369	11.34%	11.27%	2	0.95	1	0.67	0.48	1	0.03	28.5	0.16	0
Norway	180	433	12.93%	13.07%	3.86	0.42	0	0.58	0.43	1	0.01	27.5	0.48	0
Pakistan	7	98	19.26%	18.92%	3.50	0.41	1	0.58	0.52	0.3	.	.	.	3
Peru	6	26	17.45%	10.10%	1	0.45	0	0.33	0.59	0.25	0.14	17	.	2.79
Philippines	105	179	13.24%	10.60%	3.64	0.22	0	0.83	0.89	0.27	0.13	8.33	.	3.79
Portugal	61	117	11.02%	7.30%	3.11	0.44	0	0.42	0.55	0.87	0.2	16.83	0.05	3.82
Singapore	556	1,099	12.32%	8.67%	2.64	1	1	1	0.84	0.86	0.03	38.17	0.22	3.73
South Africa	280	494	16.07%	23.70%	2	0.81	1	0.83	0.58	0.44	0.02	23	0.05	2.82
Spain	231	510	10.45%	13.43%	3.03	0.37	0	0.5	0.5	0.78	0.04	11.17	0.05	3.28
Sweden	431	656	11.91%	13.17%	3.31	0.33	0	0.58	0.45	1	0.07	24.67	0.32	0
Switzerland	469	585	10.72%	11.69%	2	0.27	0	0.67	0.48	1	0.06	.	0.41	0
Taiwan	537	1,665	11.54%	5.37%	4	0.56	0	0.75	0.64	0.85	0	19.17	0.13	6.51
Thailand	261	610	14.35%	9.85%	3.26	0.81	1	0.92	0.62	0.63	0.12	21.33	0.01	3.1
Turkey	16	58	16.41%	21.97%	3.99	0.43	0	0.5	0.45	0.518	0.37	7.67	.	1.06
UK	2,293	6,680	11.16%	14.12%	2	0.78	1	0.83	0.73	0.86	0.01	34	0.28	0
US	6,765	22,306	10.30%	11.51%	4	0.71	1	1	0.97	1	0.01	32	0.33	0
Total (Average)	22,111	66,863	12.58%	13.26%	2.86	0.53	0.35	0.64	0.56	0.75	0.14	20.51	0.17	1.63

The sample is based on observations from 41 countries between 1989 and 2007, for which Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. r_{AVG} is the mean of the four estimates for the implied cost of equity capital as described in the appendix II. *CostDebt* is the interest rate on the firm's debt, which is measured as interest expense for the year divided

by average short- and long-term debt during the year. *FREQ* is the interim reporting frequency required by country *i* in year *t*. *ANTSEL* is the anti-self-dealing index representing the legal protection of minority shareholders against expropriation by controlling insiders (Djankov et al., 2008). *Common* are the common law/code law dummies (La Porta et al., 1997). *DISREG* is the disclosure regulation index measuring the level of disclosure regulation based on an index of disclosure requirements in securities offerings (Hail and Leuz, 2006). *SECREG* is the securities regulation index capturing the effectiveness of a country's securities regulation by combining the disclosure requirements index with the liability standard and the public enforcement indices (Hail and Leuz, 2006). *LAW* is the rule of law index representing the general quality of the legal environment (La Porta et al., 1997). *BLOCK* is the block premiums paid in transactions involving corporate controls measuring the private benefit of control (Dyck and Zingales, 2004). *EMD* is the measure of equity market development equal to the average percentage rank across the three La Porta et al. (1997) variables (i) ratio of the aggregate stock market capitalization held by minorities to gross national product, (ii) number of listed domestic firms relative to the population, and (iii) number of IPOs relative to the population. *GDPCap* is a country's average per capita GDP in 100,000 US dollars, reflecting the level of wealth of a country. *AutoC* is the concentration of political power equal to the average of autocracy index between 1960 and 1994 (Bushman et al., 2004). The first two columns provide the number of firm years of cost of equity capital (r_{AVG}) and cost of debt capital (*CostDebt*). The second three columns provide mean values of cost of equity capital (r_{AVG}), cost of debt capital (*CostDebt*) and interim reporting frequency (*FREQ*) and the last nine columns provide the values of anti-self-dealing index (*ANTSEL*), common law/code law dummies (*Common*), disclosure regulation index (*DISREG*), security regulation index (*SECREG*), overall quality of legal system (*LAW*), block Premium (*BLOCK*), equity market development (*EMD*), average per capita GDP (*GDPCap*) and the concentration of political power (*AutoC*).

TABLE 2
Descriptive Statistics

Panel A: Distributional statistics																	
Variable	r_{AVG}	$CostDebt$	$FREQ$	$VolFreq$	$SIZE$	ROA	LEV	$RETVAR$	BMR	$EPSVAR$	$TURN$	$LAGRET$	$FBIAS$	$RATE$	$\sigma_{(NIBE)}$	$IntCov$	$INFL$
Mean	10.80%	7.63%	3.113	0.056	5.903	0.065	0.524	0.033	0.601	0.089	0.004	0.109	0.021	0.079	0.043	20.978	0.028
1 st Quar.	8.26%	3.62%	2	0	4.370	0.029	0.367	0.020	0.167	0.017	0.001	-0.246	-0.004	0.047	0.014	1.810	0.014
Median	10.08%	6.33%	4	0	5.639	0.070	0.533	0.027	0.435	0.036	0.002	0.032	0.001	0.071	0.027	4.984	0.025
3 rd Quar.	12.62%	9.33%	4	0	7.159	0.119	0.677	0.039	0.823	0.086	0.005	0.357	0.019	0.088	0.055	15.229	0.034
Std.Dev.	3.88%	5.78%	0.999	0.331	2.154	0.115	0.219	0.018	0.594	0.132	0.005	0.544	0.057	0.067	0.043	43.462	0.019
Panel B: Pearson (upper diagonal) and Spearman (lower diagonal) Correlation coefficients																	
Variable	r_{AVG}	$CostDebt$	$FREQ$	$VolFreq$	$SIZE$	ROA	LEV	$RETVAR$	BMR	$EPSVAR$	$TURN$	$LAGRET$	$FBIAS$	$RATE$	$\sigma_{(NIBE)}$	$IntCov$	$INFL$
r_{AVG}		0.112	0.072	-0.217	-0.321	-0.101	0.114	0.161	0.332	0.170	0.081	-0.055	0.265	0.293	0.137	-0.143	0.214
$CostDebt$	0.169		0.181	-0.162	0.020	0.040	-0.193	0.096	-0.106	0.092	0.066	0.040	0.007	0.331	0.204	0.007	0.288
$FREQ$	0.092	0.287		-0.200	-0.169	0.036	-0.087	0.030	0.002	0.030	0.284	0.074	-0.006	0.171	0.143	-0.037	0.143
$VolFreq$	-0.252	-0.245	-0.200		0.084	0.017	-0.015	-0.073	-0.026	-0.022	-0.035	0.029	-0.039	-0.128	-0.048	0.137	-0.166
$SIZE$	-0.355	0.061	-0.133	0.091		0.206	0.057	-0.230	-0.550	-0.190	0.020	0.133	-0.203	-0.049	-0.065	0.044	-0.050
ROA	-0.086	0.183	0.135	-0.002	0.235		-0.048	-0.278	-0.158	-0.171	-0.158	0.175	-0.139	0.080	-0.219	0.382	0.090
LEV	0.108	-0.116	-0.085	-0.015	0.053	-0.164		-0.057	-0.053	0.077	-0.118	-0.084	0.100	-0.060	-0.207	-0.395	-0.059
$RETVAR$	0.213	0.032	0.047	-0.091	-0.336	-0.257	-0.082		0.119	0.190	0.223	-0.033	0.138	0.060	0.232	-0.058	0.008
BMR	0.317	-0.128	0.077	-0.017	-0.583	-0.249	-0.081	0.089		0.055	-0.085	-0.149	0.184	-0.048	-0.140	-0.103	-0.092
$EPSVAR$	0.327	0.110	0.040	-0.018	-0.259	-0.221	0.077	0.275	0.080		0.083	-0.019	0.097	0.085	0.321	-0.070	0.062
$TURN$	0.051	0.108	0.275	0.000	0.126	-0.032	-0.102	0.187	-0.147	0.121		0.041	0.038	0.062	0.293	-0.001	0.136
$LAGRET$	-0.072	0.040	0.075	0.038	0.175	0.256	-0.069	-0.160	-0.147	-0.057	0.045		-0.066	0.077	0.031	0.096	0.063
$FBIAS$	0.152	-0.022	-0.015	-0.039	-0.153	-0.113	0.045	0.073	0.117	0.039	0.006	-0.048		0.058	0.020	-0.099	0.042
$RATE$	0.304	0.512	0.271	-0.229	-0.098	0.210	-0.078	-0.038	-0.067	0.054	0.108	0.108	0.044		0.091	-0.067	0.538
$\sigma_{(NIBE)}$	0.203	0.215	0.187	-0.049	-0.071	0.006	-0.239	0.265	-0.129	0.391	0.295	-0.003	-0.011	0.177		0.046	0.103
$IntCov$	-0.235	-0.160	-0.059	0.167	0.148	0.717	-0.413	-0.208	-0.119	-0.231	-0.063	0.203	-0.126	-0.100	-0.035		-0.058

<i>INFL</i>	0.194	0.410	0.264	-0.208	-0.046	0.166	-0.065	-0.042	-0.093	0.054	0.190	0.082	0.013	0.730	0.166	-0.082
-------------	--------------	--------------	--------------	---------------	---------------	--------------	---------------	---------------	---------------	--------------	--------------	--------------	--------------	--------------	--------------	---------------

The sample is based on 66,863 firm-year observations from 41 countries between 1989 and 2007, for which Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. r_{AVG} , *CostDebt*, and *FREQ* are defined in Table 1. *VolFreq* is the voluntary component of interim reporting frequency, equal to the difference between actual frequency and mandatory frequency. *SIZE* stands for log of the US\$ market value of outstanding equity (in millions). Accounting profitability, *ROA*, measured by return on total assets as an additional control for accounting differences. The leverage (*LEV*) equals to the short- and long-term debt to total assets. *RETVAR* is the returns variability computed as the annual standard deviation of daily stock returns. *BMR* is the ratio of the accounting book value to market value of equity. Financial data are measured as of the fiscal year-end. EPS variance (*EPSVAR*) is a firm's standard deviation of annual earnings per share over the last five years scaled by total assets per share. We require at least three yearly observations to calculate earnings variability. Turnover (*TURN*) is defined as the mean monthly trading volume over the prior 12 months divided by the number of shares outstanding. Momentum (*LAGRET*) equals to the past 12-month accumulated return. *FBIAS* is the one-year-ahead analyst forecast error (mean forecast minus actual) scaled by forecast-period stock price. *RATE* is the country-specific bank rate that applies to the short- and medium-term financing needs of the private sector. $\sigma(NIBE)$ is defined as the standard deviation of net income before extraordinary items (*NIBE*), scaled by average assets, over the rolling prior 10-year period. We require at least five observations of *NIBE* to calculate the standard deviation. *IntCov* is the ratio of operating income to interest expense. *INFL* is the yearly median of country-specific, one-year-ahead realized annual inflation rates. In Panel B, correlation coefficients significant at 5%-level or lower are in boldface.

TABLE 3
Cross-sectional Regression Analysis About the Effect of Frequency on Cost of Capital

Panel A: Dependent Variable=r_{AVG}					
$r_{AVG_{it}} = \alpha_0 + \alpha_1 FREQ_{it} + \alpha_2 VolFreq_{it} + \alpha_3 SIZE_{it} + \alpha_4 ROA_{it} + \alpha_5 LEV_{it} + \alpha_6 RETVAR_{it} + \alpha_7 BMR_{it} + \alpha_8 EPSVAR_{it} + \alpha_9 TURN_{it} + \alpha_{10} LAGRET_{it} + \alpha_{11} FBIAS_{it} + \alpha_{12} INFL_{it} + \alpha_{13} ANTSEL_{it} + \alpha_{14} Common_{it} + \alpha_{15} DISREQ_{it} + \alpha_{16} SECREG_{it} + \alpha_{17} LAW_{it} + \alpha_{18} BLOCK_{it} + \alpha_{19} EMD_{it} + \alpha_{20} GDPCap_{it} + \alpha_{21} AutoC_{it} + \sum \alpha_j INDUSTRY_{it} + \sum \alpha_k YEAR_{it} + \varepsilon_{it}$					
Variable	Pred. Sign	M1	M2	M3	M4
<i>FREQ</i>	-	-0.001*** (-3.99)	-0.001*** (-3.85)	-0.003*** (-3.82)	-0.004*** (-4.39)
<i>VolFreq</i>	-				-0.007*** (-5.31)
<i>SIZE</i>	-	-0.006*** (-40.50)	-0.004*** (-23.53)	-0.006*** (-26.63)	-0.006*** (-26.67)
<i>ROA</i>	-			-0.026*** (-4.28)	-0.026*** (-4.19)
<i>LEV</i>	+	0.033*** (20.19)		0.035*** (17.05)	0.035*** (17.06)
<i>RETVAR</i>	+	0.010*** (5.50)	0.005*** (2.96)	-0.000 (-0.17)	-0.000 (-0.08)
<i>BMR</i>	+		0.010*** (11.59)	0.012*** (9.44)	0.012*** (9.51)
<i>EPSVAR</i>	+		0.002*** (2.87)	0.000 (0.40)	0.000 (0.35)
<i>TURN</i>	+/-			0.391*** (5.42)	0.383*** (5.32)
<i>LAGRET</i>	+/-			-0.000 (-1.35)	-0.000 (-1.40)
<i>FBIAS</i>	+	0.035*** (7.24)	0.039*** (7.59)	0.035*** (6.06)	0.035*** (6.10)
<i>INFL</i>	+	0.638*** (23.30)	0.657*** (21.40)	0.005 (0.10)	0.009 (0.20)
<i>ANTSEL</i>	+/-			0.002** (2.20)	0.002** (2.04)
<i>Common</i>	+/-			0.021*** (7.66)	0.020*** (7.29)
<i>DISREQ</i>	-			-0.035*** (-2.87)	-0.035*** (-2.89)
<i>SECREG</i>	-			-0.017* (-1.69)	-0.016 (-1.62)
<i>LAW</i>	-			-0.071*** (-10.78)	-0.069*** (-10.43)
<i>BLOCK</i>	+/-			-0.033*** (-3.47)	-0.031*** (-3.31)
<i>EMD</i>	+/-			0.001*** (4.26)	0.001*** (4.34)
<i>GDPCap</i>	+/-			0.000*** (3.43)	0.000*** (3.48)
<i>AutoC</i>	+/-			0.000 (1.01)	0.000 (0.98)
INTERCEPT, INDUSTRY & YEAR dummies included		YES	YES	YES	YES
Adj. R ²		25.23%	25.20%	38.32%	38.46%
F Statistic		121.48**	104.38***	331.76***	325.20***
Sample size		15,566	14,180	9,426	9,426

Panel B: Dependent Variable=cost of debt

$$CostDebt_{it} = \alpha_0 + \alpha_1 FREQ_{it} + \alpha_2 VolFreq_{it} + \alpha_3 SIZE_{it} + \alpha_4 ROA_{it} + \alpha_5 LEV_{it} + \alpha_6 RATE_{it} + \alpha_7 \sigma(NIBE)_{it} + \alpha_8 IntCov_{it} + \alpha_9 INFL_{it} + \alpha_{10} ANTSEL_{it} + \alpha_{11} Common_{it} + \alpha_{12} DISREQ_{it} + \alpha_{13} SECREG_{it} + \alpha_{14} LAW_{it} + \alpha_{15} BLOCK_{it} + \alpha_{16} EMD_{it} + \alpha_{17} GDPCap_{it} + \alpha_{18} AutoC_{it} + \sum \alpha_j INDUSTRY_{it} + \sum \alpha_k YEAR_{it} + \varepsilon_{it}$$

Variable	Pred. Sign	M1	M2	M3	M4
<i>FREQ</i>	-	-0.002** (-2.07)	-0.002** (-2.10)	-0.012*** (-3.66)	-0.013*** (-3.95)
<i>VolFreq</i>	-				-0.020** (-2.47)
<i>SIZE</i>	-	0.000 (1.18)	0.000 (0.99)	-0.005*** (-6.43)	-0.005*** (-6.52)
<i>ROA</i>	-	0.021 (1.61)	0.021 (1.60)	0.050*** (2.60)	0.051*** (2.63)
<i>LEV</i>	+	0.025*** (24.15)	0.025*** (23.87)	0.024*** (14.61)	0.024*** (14.61)
<i>RATE</i>	+	0.633*** (11.17)	0.632*** (11.04)	0.430*** (4.60)	0.437*** (4.64)
$\sigma(NIBE)$	+			0.309*** (8.55)	0.310*** (8.56)
<i>IntCov</i>	-			0.000 (1.44)	0.000 (1.43)
<i>INFL</i>	+	0.701*** (6.55)	0.686*** (6.45)	0.167 (0.92)	0.159 (0.88)
<i>ANTSEL</i>	+/-		0.005 (0.72)	-0.235*** (-7.17)	-0.237*** (-7.27)
<i>Common</i>	+/-			0.114*** (7.80)	0.114*** (7.80)
<i>DISREQ</i>	-			-0.041 (-0.86)	-0.046 (-0.95)
<i>SECREG</i>	-			-0.090* (-1.91)	-0.086* (-1.83)
<i>LAW</i>	-			-0.065*** (-2.62)	-0.065*** (-2.60)
<i>BLOCK</i>	+/-			-0.126*** (-3.89)	-0.128*** (-3.96)
<i>EMD</i>	+/-			0.001 (0.92)	0.001 (0.96)
<i>GDPCap</i>	+/-			0.000 (1.05)	0.000 (1.03)
<i>AutoC</i>	+/-			-0.003* (-1.83)	-0.003* (-1.73)
INTERCEPT, INDUSTRY & YEAR dummies included		YES	YES	YES	YES
Adj. R ²		6.44%	6.44%	6.83%	6.85%
F Statistic		58.22***	62.29***	16.68***	16.54***
Sample size		58,224	58,224	25,777	25,777

The sample is based on 66,863 firm-year observations from 41 countries between 1989 and 2007, for which Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. *INDUSTRY* dummies are based on I/B/E/S sector data and 11 sectors are classified. *YEAR* dummies and intercept are included in the regression. All other variables are as defined in Table 1 & 2. The regressions are clustered by firm and year.

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 4
Sensitivity Analyses for the Cross-Sectional Cost of Capital Effects

Panel A: Alternative Cost of Equity Capital Estimates

<i>Info. On $FREQ$ and Regressions</i>	<i>$FREQ$</i>	<i>Adj. R^2</i>	<i>Sample size</i>
r_{GLS}	-0.007*** (-7.32)	31.86%	19,540
r_{CT}	-0.005*** (-4.87)	23.48%	17,322
r_{GM}	-0.003*** (-3.91)	32.27%	14,210
r_{PEG}	-0.005*** (-5.84)	30.80%	24,949
First principal component of individual COC measures	-0.123*** (-3.36)	39.30%	9,103
Model fit-weighted average COC measures	-0.003*** (-3.74)	36.82%	9,103
Accuracy-weighted COC regression	-0.001*** (-3.46)	50.87%	9,103
Dividend yield	-0.005*** (-6.20)	2.08%	40,033

Panel B: Alternative Model Specifications and Sample Restrictions

<i>Info. On $FREQ$ and Regressions</i>	<i>r_{AVG} as DV</i>			<i>CostDebt as DV</i>		
	<i>$FREQ$</i>	<i>Adj. R^2</i>	<i>Sample size</i>	<i>$FREQ$</i>	<i>Adj. R^2</i>	<i>Sample size</i>
Growth rate instead of book-to-market ratio	-0.004*** (-10.12)	33.29%	12,506			
Use local risk-free rates instead of inflation	-0.003*** (-7.91)	41.24%	12,181	-0.013*** (-4.08)	6.85%	25,777
Risk premiums instead of COC estimates	-0.003*** (-7.72)	37.00%	12,181	-0.010*** (-2.98)	6.55%	25,777
Alternatively control for the first principal component of all 9 country-specific factors	-0.013*** (-25.12)	34.30%	9,426	-0.017*** (-8.05)	6.28%	25,777
Drop US and Japan Sample	-0.004*** (-4.06)	33.29%	4,535	-0.010*** (-2.79)	7.64%	10,253
Results based on full model for country-level sample	-0.005*** (-2.72)	49.51%	284	-0.017*** (-2.86)	50.97%	267

The sample is based on 66,863 firm-year observations from 41 countries between 1989 and 2007, for which Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. The two panels report only the coefficients (t-statistics) of the $FREQ$ variable and adjusted R^2 and sample size of the regressions, but regressions include the full set of controls, industry- and year-fixed effects (see Model 4 in both Panel A and Panel B of Table 3). In panel A, we report results for the following alternative

dependent variables: the four individual cost of capital estimates, the first principal component of the four individual estimates, the model fit-weighted average of the four estimates (in which the R^2 from country regressions of the individual cost of capital estimates on the firm attributes and year-fixed effects serve as weights), the accuracy-weighted cost of capital (accuracy is measured as the inverse of the absolute one-year-ahead analyst forecast error scaled by lagged total assets) and dividend yield (last year's actual dividends divided by stock price as of month +10). In panel B, regressions are based on the following alternative model specifications: (1) we replace book-to-market ratio by analyst forecast growth rate, (2) we control for inflation rather than the contemporaneous local risk-free or money-market rate, r_f , measured as country/year median of monthly values (source: Datastream and World Bank), (3) we use the risk premium (COC minus r_f) instead of the raw cost of capital estimates as the dependent variable, (4) we alternatively control for the first principal component of the 9 country-specific factors rather than those factors in our regressions (*ANTSEL*, *Common*, *DISREQ*, *SECREG*, *LAW*, *BLOCK*, *EMD*, *GDPCap* and *AutoC*), (5) we use two-stage-least-squares estimation (2SLS) with the 9 country-specific factors as instruments (meanwhile those nine factor are not included in the 2nd-stage regressions) to address the concern of endogenous issue, (6) the regression results are based on sample dropping observations from Unites States and Japan, and (7) we run regressions based on the country level, where the value of each variable equals to the country-year median of the variable. The regressions are clustered by firm (or country where appropriate) and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 5

Difference-in-differences Analysis of the Effect of Frequency on Cost of Capital

<i>Panel A: Changes in Mandatory Interim Reporting Frequency</i>		
Country	Change From Annual to Semiannual	Change From Semiannual to Quarterly
China	January, 1994	June, 2001
Greece		January, 1998
India		June, 1998
Korea		January, 1999
Malaysia		August, 1999
Norway		January, 1999
Pakistan		January, 2003
Portugal	January, 1991	January, 1999
Singapore		January, 2003

<i>Panel B: Univariate Analysis of the Cost of Capital (Pre- vs. Post-Frequency-Increase)</i>							
Measures	Cost of Equity Capital (r_{AVG})			Cost of Debt Capital ($CostDebt$)			
	Pre	Post	Post-Pre	Pre	Post	Post-Pre	Post-Pre
Event (t-stat.)	0.127*** (21.53)	0.112*** (25.93)	-0.015*** (-3.54)		0.115*** (11.82)	0.109*** (10.81)	-0.006 (-0.55)
Control (t-stat.)	0.111* (27.4)	0.102*** (28.85)	-0.009** (-2.30)		0.101*** (12.55)	0.091*** (13.86)	-0.010 (-1.11)
Difference (t-stat.)	0.016** (2.62)	0.010* (1.83)	-0.006 (-1.30)		0.014 (1.11)	0.018 (1.56)	0.04 (0.29)

Panel C: Regression Analysis of the Cost of Capital (Pre- vs. Post-Frequency-Increase)

$$COC_{it} = \alpha_0 + \alpha_1 EVENT_{it} * AFTER_{it} + \alpha_2 EVENT_{it} + \alpha_3 AFTER_{it} + \alpha_4 SIZE_{it} + \alpha_5 ROA_{it} + \alpha_6 LEV_{it} + \alpha_7 RETVAR_{it} + \alpha_8 BMR_{it} + \alpha_9 EPSVAR_{it} + \alpha_{10} TURN_{it} + \alpha_{11} LAGRET_{it} + \alpha_{12} FBIA_{it} + \alpha_{13} RATE_{it} + \alpha_{14} \sigma(NIBE)_{it} + \alpha_{15} IntCov_{it} + \alpha_{16} INFL_{it} + \alpha_{17} ANTSEL_{it} + \alpha_{18} Common_{it} + \alpha_{19} DISREG_{it} + \alpha_{20} SECREG_{it} + \alpha_{21} LAW_{it} + \alpha_{22} BLOCK_{it} + \alpha_{23} EMD_{it} + \alpha_{24} GDPCap_{it} + \alpha_{25} AutoC_{it} + \sum \alpha_j INDUSTRY_{it} + \sum \alpha_k YEAR_{it} + \varepsilon_{it}$$

Variable	Pred. Sign	Years -1/+1 only		All years (except year0)	
		r_{AVG}	$Cost\ of\ Debt$	r_{AVG}	$Cost\ of\ Debt$
$EVENT * AFTER$	-	-0.016** (-2.20)	-0.064* (-1.68)	-0.011*** (-2.95)	-0.045*** (-3.66)
$EVENT$	N.A.	0.040 (0.69)	-2.377 (-0.18)	0.031*** (2.78)	0.021 (0.31)
$AFTER$	N.A.	0.002 (0.38)	-0.013 (-0.76)	-0.003 (-1.13)	-0.004 (-0.69)
$VolFreq$	-	0.004** (2.19)	-0.001 (-0.17)	0.007*** (6.27)	-0.001 (-0.23)
$SIZE$	-	-0.007*** (-5.21)	-0.009 (-1.56)	-0.006*** (-9.34)	-0.007*** (-3.38)
ROA	-	0.003 (0.12)	0.154 (1.46)	-0.027* (-1.82)	0.128** (2.36)
LEV	+	0.033*** (3.80)	0.012* (1.74)	0.030*** (5.19)	0.012*** (4.01)

<i>RETVAR</i>	+	-0.014 (-1.51)		-0.001 (-0.19)	
<i>BMR</i>	+	0.020*** (3.73)		0.010*** (4.60)	
<i>EPSVAR</i>	+	0.003 (0.65)		0.002 (0.97)	
<i>TURN</i>	+/-	0.405 (1.57)		0.545*** (2.95)	
<i>LAGRET</i>	+/-	-0.000 (-1.20)		-0.000 (-0.38)	
<i>FBIAS</i>	+	0.029 (1.24)		0.011 (1.61)	
<i>RATE</i>	+		-1.070 (-1.34)		0.251 (0.82)
$\sigma(NIBE)$	+		0.278 (1.28)		0.247** (2.15)
<i>IntCov</i>	-		0.000 (0.70)		-0.000 (-0.34)
<i>INFL</i>	+	0.309 (0.42)	0.591 (0.82)	0.547*** (3.99)	-0.570* (-1.71)
<i>ANTSEL</i>	+/-	0.015 (0.71)	5.700 (0.18)	-0.001 (-0.20)	-0.108 (-1.04)
<i>Common</i>	+/-	-0.052 (-0.83)	-7.070 (-0.20)	0.041*** (2.88)	0.033 (0.61)
<i>DISREQ</i>	-	-0.018 (-0.16)	8.623 (0.20)	0.030 (1.43)	-0.030 (-0.44)
<i>SECREG</i>	-	0.168 (0.56)	-1.180 (-0.13)	-0.079** (-2.20)	0.083 (0.49)
<i>LAW</i>	-	-0.006 (-0.07)	-2.730 (-0.20)	0.072** (2.56)	-0.078 (-0.97)
<i>BLOCK</i>	+/-	0.072 (0.80)	10.066 (0.21)	-0.085*** (-3.95)	-0.027 (-0.52)
<i>EMD</i>	+/-	0.002 (0.81)	-0.001 (-0.25)	-0.001* (-1.90)	-0.001 (-1.06)
<i>GDPCap</i>	+/-	0.000 (0.13)	-0.038 (-0.20)	0.000** (2.38)	0.000 (0.34)
<i>Autocracy</i>	+/-	0.002 (0.70)	0.001 (0.25)	-0.001 (-0.95)	-0.001 (-0.40)
INTERCEPT, INDUSTRY dummies & YEAR dummies included		YES	YES	YES	YES
Adj. R ²		44.18%	6.15%	39.83%	8.61%
F Statistic		16.14***	3.51***	12.75***	19.72***
Sample size		324	777	1,376	3,083

The sample comprises 3,083 firm-year observations from countries with the increase in interim reporting frequency over the period from 1989 to 2007 and from the industry-size-matched control firms in United States in the same period. We require Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. *COC* is proxied by r_{AVG} or *CostDebt*. *EVENT* is a dummy variable with the value of one for firms from countries with the increase in interim reporting frequency and zero for control firms. *AFTER* is a dummy variable taking the value of one for the period after the frequency increase and zero for the period before the frequency increase. All other variables are as defined in Table 1 & 2. The regressions are clustered by firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

TABLE 6
Information Content in Interim and Annual Earnings Announcements by Reporting Frequency

<i>Panel A: Full sample</i>				
Frequency	Annual reporting	Semiannual reporting	Three-time reporting	Quarterly reporting
Abnormal R^2	4.81%	8.60%	9.69%	10.87%
<i>Panel B: Event sample</i>				
	Before the increase	After the increase	Difference	
Abnormal R^2	7.84%	10.73%	2.89%	

The sample is based on 66,863 firm-year observations from 41 countries between 1989 and 2007, for which Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. Abnormal R^2 is the R^2 in a regression of twelve-month returns on a set of one (for annual reporters), two (for semiannual reporters), three (for firms reporting three times) or four (for quarterly reporters) announcement window returns, adjusted for the expected R^2 . The announcement windows are the three-day intervals around the interim and annual earnings announcement dates. The expected R^2 is equal to 3 (6, 9 or 12) divided by the average number of trading days per year for annual (semiannual, three-time, or quarterly) reporters.

TABLE 7
Differences in the Cost of Capital Effects by Legal Institutions

Variable		DV= r_{AVG}			DV= $CostDebt$		
		FREQ	Adj. R ²	Sample size	FREQ	Adj. R ²	Sample size
Self-dealing Regulation	Low	-0.000 (-0.09)	42.10%	2,110	0.015** (2.42)	11.67%	3,378
	High	-0.004*** (-8.91)	37.16%	10,394	-0.008*** (-5.09)	8.28%	36,181
	Difference	-0.004*** (-9.58)			-0.023*** (-6.90)		
Legal tradition	Code law	0.005*** (7.01)	48.16%	4,650	0.014*** (3.70)	10.67%	15,081
	Common law	-0.010*** (-16.18)	35.41%	7,854	-0.027*** (-12.30)	6.30%	24,478
	Difference	-0.015*** (-37.66)			-0.041*** (-12.55)		
Disclosure Regulation	Low	-0.000 (-0.06)	36.49%	1,878	0.004 (0.91)	10.78%	3,582
	High	-0.003*** (-7.82)	35.15%	10,626	-0.009*** (-5.24)	8.35%	35,977
	Difference	-0.003*** (-8.57)			-0.013*** (-3.86)		
Security Regulation	Low	0.005*** (5.22)	49.46%	3,577	0.010*** (2.67)	10.46%	14,004
	High	-0.011*** (-24.29)	33.80%	8,927	-0.020*** (-10.32)	6.12%	25,555
	Difference	-0.016*** (-41.22)			-0.030*** (-9.29)		
Legal Environment	Low	0.004 (0.81)	45.15%	694	-0.019*** (-3.03)	14.75%	3,166
	High	-0.006*** (-6.29)	35.77%	8,732	-0.017*** (-8.66)	8.26%	36,393
	Difference	-0.010*** (-25.50)			0.002 (0.51)		
Private Benefits of Control	High	0.004* (1.69)	36.30%	733	0.020** (2.02)	9.63%	1,971
	Low	-0.005*** (-11.97)	31.56%	11,771	-0.008*** (-5.22)	8.22%	37,588
	Difference	-0.009*** (-22.03)			-0.028*** (-8.43)		
Equity Market Development	Low	0.000 (0.65)	31.33%	2,581	0.001 (0.26)	9.36%	5,264
	High	-0.006*** (-13.31)	34.50%	9,923	-0.021*** (-10.13)	8.89%	33,943
	Difference	-0.006*** (-18.07)			-0.022*** (-6.77)		

The sample is based on 66,863 firm-year observations from 41 countries between 1989 and 2007, for which Compustat Global financial data, I/B/E/S forecast and pricing data, and frequency data exist. We partition the sample into subsamples according to the following proxies of legal institutions: (1) anti-self-dealing regulation that is high for countries with above-median values of the anti-self-dealing index (*ANTSEL*), (2) legal tradition captured by the common law/code law dummies (*Common*), (3) disclosure regulation that is high for countries with above-median the disclosure regulation index (*DISREG*), (4) security regulation that is set to be high for countries with above-median values of the security regulation index (*SECUREG*), (5) legal environment that is high for countries with above-median values of the overall quality of legal system (*LAW*), (6) private benefits of control that are assumed to be low for countries with below-median block premium (*BLOCK*), and (7) equity market development that is high for countries with above-median *EMD*. We compute all median values to partition the sample based on the firm-years available. The dependent variable is either r_{AVG} or $CostDebt$. All other variables are as defined in Table 1 & 2. The regressions are clustered by firm and year. ***, **, and * indicate statistical

significance at the 1%, 5%, and 10% levels (two-tailed), respectively.