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Mandatory Changes in Financial Reporting and Market Efficiency in an Emerging Market

(Empirical Evidence from Malaysia)

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A DISSERTATION
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Abstract

It is generally believed that the provision of more frequent information will make markets more efficient. However at some point the marginal gain will become trivial and the cost of providing and processing the information may well exceed the gain. Most work on this issue relating to corporate disclosure is in the context of advanced countries and it may be that the balance of gains is different in emerging markets where the distortions are greater. From a natural experiment, the author is able to look at the gains which may have been reaped from the introduction of quarterly disclosure in Malaysia (from the previous bi-annual disclosure). Some firms were already disclosing voluntarily, therefore, a difference-in-differences (DID) study is undertaken to compare the two groups very closely despite all the other changes that have occurred over the same period. The sample data relates to all the main firms quoted the Malaysian stock exchange between 1997 and 2001 with introduction of mandatory quarterly disclosure starting in 1999. Unfortunately, the two treated group and the control group are rather different in characteristics. So, a specific form of DID is used to account for this. The choice of Malaysia is helpful in that it was one of the earliest movers to quarterly disclosure among the Asian emerging markets. So, other emerging markets can take advantage of the experience in judging whether to make similar changes themselves and the Malaysian authorities can consider whether they have reached the limits of improving disclosure. The results suggest that there are gains from requiring quarterly disclosure but the evidence is not particularly clear cut.

For my family

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Abbreviation

ACAR	Absolute cumulative abnormal return
AnnualR	Annual return
AR	Abnormal return
ATE	Average treatment effect
ATT	Average treatment effect on treated
BHR	Buy-and-hold returns
CICT	Changes in information content and timeliness
DBR	Disclosure based regime
DEC-FYE	December financial year-end
DID	Difference-in-differences
EA	Early Adopters
EADs	Earnings announcement dates
FYE	Financial year-end
IPT	Intra-period timeliness
IRF	Increased reporting frequency
MA	Mandatory Adopters
MBR	Merit based regime
PSM	Propensity scores matching
R&D	Research and development
Winr	Window returns

CHAPTER 1 INTRODUCTION

- 1.0 Introduction
- 1.1 Research Objective
- 1.2 Motivations
- 1.3 Contributions
- 1.4 Data, Methodology and Findings
- 1.5 Thesis Structure

1.0 INTRODUCTION

1.1 Research Objectives

This study examines the effectiveness of a legal reform requiring more frequent financial reporting (from semi-annual to quarterly reporting) by using the Difference-in-differences methodology, which takes account of changes due to the passage of time and other possible causes of changes during the same period. The introduction of quarterly reporting to the continuous disclosure regime is expected to (i) increase information content¹ due to a higher level of transparency at the firm level; and (ii) improve information timeliness, where the market reacts to the early arrival of financial information, thereby changing equity prices by incorporating the relevant information available for these securities. Both the increases in firm level transparency and information timeliness should contribute to more efficient² pricing.

1.2 Motivations

This empirical study forges a link between efficiency and disclosure through the legal enforcement of corporate transparency. The provision of more frequent information by firms improves the information environment, which helps investors in making better investment decisions. For example, the periodic earnings announcement reveals significant information about firm performance that may change investors' behaviour, thereby moving security prices (Beaver, 1968). Consequently, improvement in disclosures improves market efficiency (Heflin, Subramanyam & Zhang, 2003). Thus, during a financial crisis period, one of the most common

¹ Information content refers to news that may change investors' expectation of outcomes (Beaver, 1968).

² Pricing efficiency in the capital market refers to how efficiently share prices reflect all the relevant information available in the market (Copeland, Weston & Shastri, 2005).

government responses is to change specific policies, such as increasing disclosures frequency to enhance market transparency and reduce information asymmetry³ in order to control the capital market.

Despite both the good regulation and the good internal governance required for a more efficient market, sometimes, the intervention of government does not work (Eleswarapu, Thompson, & Venkataraman, 2004; Gigler & Hemmer, 1998; Krinsky & Jason, 1996). Even though the international financial crisis and corporate scandals, such as 1997/98 Asian Financial crisis, 2001 and 2007/08 Global Financial crisis, have led to securities regulation reforms, greater reporting and disclosure requirements (Leuz & Wysocki, 2008), such changes are usually followed by questioning of whether these newly introduced legal reforms actually work. For example, two of the key contributors to the 1997/98 Asian Financial Crisis are weak corporate governance among the Asian economies and the severe under-regulation of financial sectors (APEC Economics Committee, 1999; Radelet & Sachs, 1999). In response to these circumstances, after the 1997/98 Asian Financial Crisis, the Malaysian government introduced a series of legal reforms, one of which was the introduction of quarterly reporting, effective from 1999. The purpose was to increase the level of transparency and allow more rapid dissemination of information to investors. This should also reduce the information gap between the informed and uninformed investors, which mitigates the information asymmetry (Heflin, Subramanyam & Zhang, 2003). However, there is also argument about the cost effectiveness of disclosing more information to the public via quarterly reporting. If the costs of practising quarterly reporting exceed the benefits, then the practice of quarterly reporting becomes unnecessary. Thus, it is of interest to study the

³ Information asymmetry refers to the imbalance of information distribution among private and public information users, such as investors, financial analysts, bankers and creditors.

effectiveness of legal reform to IRF, especially under the mandatory continuous disclosure environment, for the regulator's awareness on the gains from this legal reform.

Conversely, however, it is no surprise that corporates may retain the practice of higher periodic reporting frequency even if the test of effectiveness of legal reform to IRF does not demonstrate a favorable outcome. This possible response of corporates may be explained if, first, the periodic reports contain confirmative disclosures (Gigler & Hemmer, 1998). Even where they carry primary or secondary information, the periodic reports mitigate information uncertainty over firms' financial status from other unreliable sources. The disclosures are therefore more genuine since they are provided by the management in order to fulfill the listing requirements and higher in accuracy, where management can credibly communicate their information to the investors even where it is not directly verifiable and is unaudited. Second, when reliable information is more equally distributed across traders, it reduces information asymmetry and triggers better market liquidity (Heflin et al., 2003). Extant literature supports this argument of a relationship between corporate disclosure and market liquidity (Heflin et al., 2003). However, there are also previous studies that document insignificant results on the effect of increased disclosure frequency on market efficiency (Eleswarapu, Thompson, & Venkataraman, 2004; Gigler & Hemmer, 1998; Krinsky & Jason, 1996).

Finally, the research methodology used in the developed economies, however, may not be (1) the best to explain the effectiveness of the legal reform, and may not be (2) suitable for emerging economies. The studies of developed economies in the recent past decades report moderate findings on the effectiveness of higher reporting frequency (Ball & Shivakumar, 2008; Butler,

Kraft & Weiss, 2007). These studies employ various methods in assessing the effectiveness of legal reforms to reporting frequency, for example, Ball & Shivakumar (2008) measure the contribution of quarterly financial information to the total information environment; whereas Butler et al. (2007) measure the timeliness, the speed of financial information incorporated into the security prices. However, the analysis findings reported in developed economies may not be generalizable to all economies. For example, if a research model is applied to test the impact of a change in a specific regulation in both the emerging and developed economies, the findings for emerging economies may differ relative to the results attained in developed markets (Budsaratragoon, Hillier, & Lhaopadchan, 2012). This is because the usefulness of accounting information is subject to the firm and country characteristics (Alford, Jones, Leftwich, & Zmijewski, 1993; Collins & Kothari, 1989; Healy & Palepu, 2001). Specific causes underlying such differences in analysis findings may include disparities in the information environment, reflecting that there are less efficient financial markets and weaker institutional governance in the emerging markets relative to specific developed markets (Ball, Kothari, & Robin, 2000). The differences between the emerging economies and developed economies are further discussed in Section 3.1.1 under the chapter of Literature Review of this study. In summary, it is of interest to identify an appropriate method to test on the legal reform effectiveness for this emerging economy of Malaysia. In emerging economies, some studies which consider on the usefulness of annual reports find significant results (Dogan, Coskun & Celik, 2007; Leventis Weetman, 2004; Haw, Qi, Wu & Woody, 2000), and a few research works that study on the usefulness of quarterly reporting document some mixed /insignificant findings (Yang, 2009; Ku Ismail and Chandler, 2003, 2005 & 2005b); these studies focus on different aspects of higher reporting frequency and use different methodologies to test on the effectiveness of the legal reform.

From a natural experiment, gains may be reaped from the introduction of quarterly reporting in an emerging economy, Malaysia. This study is not just to measure the differences in the effect of new legal reform between the affected and unaffected firms, but also aim to explore a better approach for assessing the effectiveness of policy change to periodic reporting. This study applies Heckman's DID analysis with Propensity score matching (thereafter named PSM), while applying the metric based on Ball and Shivakumar (2008), to seek evidence of effectiveness of legal reform of increased reporting frequency (thereafter named IRF)⁴ in Malaysia. There is no institutional factor included in the test models of this study because it does not aim to check on the differences in findings between developed markets and emerging markets. The peculiarities of an emerging market that have been taken into account in this study are the size of sampled firms, which are mostly small-medium sized firms with concentrated ownership structures, and the agency costs that proxies the level of firm governance.

It is also important to highlight that, in this study, the focus is on the relevance of information rather than finding out which financial element needs to be disclosed for a better quality of report. It is about earlier arrival of news in a quarterly report than bi-annual report, with quarterly reporting, news is available three months earlier than under bi-annual reporting. The news disclosed are assumed to be reliable because in Malaysia, it is enforced by law that accountants should prepare accounts in compliance to certain accounting standards, and Malaysia has adopted International Accounting Standards (IASs) set by the International Accounting Standard Board since 1978.

⁴ In this study, the term of increased reporting frequency (IRF) and higher reporting frequency are interchangeable with the quarterly reporting.

Finally, there are a few limitations noted in carrying out this study: (1) the use of small sample set, where large bandwidth has been set for a small sample in DID analysis. (2) There are other regulation changes taking place at the same time of the introduction of higher reporting frequency, and the model selected in this study has accounted for this issue. (3) Not all the firms are the same; there are different firm characteristics to be accounted for, and this study has considered the size effect and agency costs.

In short, it is important to find out if a new legal reform works effectively in reaching the objective of the regulator. Since there is no single method that may suit all studies of all markets, the findings of analysis in the developed market may not be generalised to the emerging market. This study employs a DID model with PSM analysis to explore whether the increased frequency in periodic reporting (1) improves the information environment and market transparency with more timely content; (2) increases information timeliness, which mitigates the information asymmetry between the informed and uninformed traders, that moves market efficiency. The Differences-in-differences (DID) methodology with propensity score matching analysis accounts for the firm characteristics, time factor and all other changes that have occurred over the same period of time.

1.3 Contributions

Malaysia is selected in this study because it was the first to adopt quarterly reporting to increase the frequency of disclosures among the Asia emerging economies. The main result of significant treatment effect of this mandatory legal reform to IRF in Malaysia is a contribution to the literature of economic consequences of financial reporting and disclosure regulation for emerging economies. Based on the analysis findings, the Malaysian government may be able to assess whether they have met the objectives of improving disclosure frequency. The findings of this study may also have implications for the government/policy makers of other emerging economies that adopted quarterly reporting or may be considering disclosure reforms. These include those emerging economies that are facing the issue of mitigating foreign investor risk especially during financial crises.

This study of the Malaysian capital market may be valuable if the outcome is applicable to other emerging economies that share similar characteristics, in particularly emerging economies that have equity markets which are less efficient (Lim & Brooks, 2010a), and equity markets where the ownership structure is concentrated or which are largely composed of small to medium-size firms. For example, Malaysia is ranked as one of the least efficient emerging countries among 25 developed and 33 emerging countries in the World Bank's composite efficiency index (Lim & Brooks, 2010a). In addition, Malaysia is characterized by small-medium size firms. Based on the average total assets of 582 firms within 2001-2002, 13% (74 out of 582) of these firms are large firms and the balances of these firms (87%) are small firms. (Refer to Appendix 9 for the details).

Even though the difference-in-differences (DID) approach is a widely used methodology in the accounting literature in the recent decade (Francis, Hasan, Park & Wu, 2014; Ahmed, Neel &

Wang, 2013; Naranjo, Saavedra and Verdi, 2013), there are still few studies that apply DID methodology to quantify the effect of legal changes to financial reporting on the market efficiency of an emerging capital markets to-date. For example, Francis et al. (2014) use DID analysis with propensity score matching to study the level of conservatism of different gender in financial reporting decision-making in Finland. Another study by Ahmed et al. (2013) employs a DID model in their study of the impact of mandatory adoption of IFRS on accounting quality for 20 countries that adopted IFRS in 2005. A recent study by Naranjo et al. (2013) sheds light on the impact of the adoption of IFRS on financial decisions in external financing around the world. Some of the finance studies are made with DID methodology, use a cross-sectional approach, as a secondary analysis in examining the effect of reporting frequency on cost of capital and information asymmetry (Fu, Kraft and Zhang, 2013). Another recent study uses DID methodology as a secondary analysis in examining the international equity investment pattern of investors from the United States (Ammer, Holland, Smith, & Warnock, 2012). So, the DID methodology is not a new methodology but one of the widely used analysis tools. It is a two-stage model that can be used to test on any variable outcome, such as CICT, that may change over time due to the introduction of a legal reform.

Different from other studies, this study applies the ‘DID methodology with propensity score matching’ as a primary methodology that captures the treatment causal effect of legal reform to higher reporting frequency on an emerging economy’s level of transparency and market efficiency. So far, no such study has employed the DID with PSM methodology to test on the effectiveness legal reform to IRF in the Malaysian context. In addition, this study creates artificial window to allow like-with-like comparison of securities returns around the four-quarter of

earnings announcement dates (hereafter named EADs) for both pre- and post-legal reform period, where two EADs during the pre-legal reform period are artificial windows. Therefore, the application of DID methodology and the used of artificial windows in this study may also contribute towards the research method in the accounting literature.

1.4 Data, Methodology and Findings

Data & Methodology

This study applies the Difference-in-differences (DID) methodology (Heckman, Ichimura, & Todd, 1998), an economic model that captures the *causal effect* of the policy changes on equity prices of firms which are mandated to switch from bi-annual to quarterly reporting, and the changes of investor behaviour around these earnings announcement dates. Since some of the firms voluntarily adopt quarterly reporting before the legal reform to IRF, the DID method allows the comparison of treatment effects of these two groups, the mandatory adopters and the early adopters (including the voluntary adopters), by controlling on their differences in firm characteristics despite all the other changes that have occurred over the same period of time. Hence, the two-stage procedures of DID with PSM analysis is employed to account for this factor of firm characteristics.

This is an event-study (MacKinlay, 1997) uses panel data of 1360 observations on earnings announcement dates of 85 firms listed on Bursa Malaysia between 1997 and 2001, with the introduction of mandatory quarterly reporting in 1999. In this model, the ‘changes of information content and timeliness’ (CICT) is used as a proxy of the changes in the contribution of more

frequent reporting to total information environment, which may indicate the increase or decrease of firm level of transparency. To allow like-with-like comparison of analysis outcomes between the pre- and post-legal reform period, since there are only two periodic reporting dates in pre-legal reform period, artificial windows are created and tested as random to make up four periodic reporting dates in this pre-legal reform period. (Refer to the details under Section 5.3).

Following Ball and Shivakumar (2008), the increase in information content is indicated by increased contribution of timely news (3-day buy-and-hold equity return) surrounding the earnings announcement date to total information environment. CICT used in this study is a measure of the changes in the association of annual average buy-and-hold return of firms to their periodic earnings announcement buy-and-hold returns. The strengthened association between annual returns and returns surrounding reporting dates may indicate higher and timelier information content after the legal reform to IRF. (Ball & Shivakumar, 2008).

Since the main objective of this study is to investigate the effectiveness of legal reform to implement IRF, it examines the increased content due to more frequent reports released to the public which contributes to the total information environment (Ball & Shivakumar, 2008). It chooses Heckman's DID model with propensity score matching model to test for these significant changes in information content and timeliness to the information environment. Therefore, this study does not follow Butler et al.'s (2007) model which employs Heckman's Correction Model (with an Inverse Mills Ratio), focuses on the speed of information being incorporated in the security prices for the short term timeliness and long term timeliness. It chooses Heckman's DID model with propensity score matching as the main analysis over Heckman's Correction Model for

some reasons: (1) the usage of propensity score (conditional probability) is more effective than the Inverse Mills Ratio (thereafter named IMR), (2) Heckman's DID model accounts for time variance and eliminates the bias, where the Heckman's Correction Model minimises the bias, (3) the issues of fragility of empirical findings from using Heckman's Correction Model and high multicollinearity lead to concerns in using that selection model (Tucker, 2010).

Alternative matching methods of the Matching estimator (Abadie & Imbens, 2002, 2006) with propensity scores matching, and the nearest neighbor matching with Mahalanobis distance (Cochran & Rubin, 1983), have been used to find supportive evidence to the main analysis. There is also an alternative DID approach included in this study based on Wooldridge (2013)'s DID cross-sectional regression (Wooldridge, 2013) to support the findings of the main analysis.

Robustness checks, which are also based on Ball and Shivakumar (2008)'s model, are carried out to verify on the effects of legal reform to IRF on firms that are mandated to switch and adopt a quarterly reporting regime. These tests include: (1) firm-year cross-sectional regressions on mandatory adopters (thereafter named MA); (2) firm-year cross-sectional regressions on MA firms with December financial year-end (DEC-FYE). A Chow test is utilized to check whether there is significant change in the cor-relation between annual returns and the returns around periodic reporting dates (interchangeable with window returns) in the pre- and post-legal reform periods. The test is also used to compare the changes in association of annual returns and periodic earnings announcement date returns during the crisis and non-crisis periods.

As an additional test on information timeliness, the information gap (Heflin et al., 2003) is measured by monitoring the change of abnormal returns surrounding the earnings announcement dates at quarter two and quarter four (mid-year and year-end respectively). A decrease in abnormal returns may indicate a lower information asymmetry due to timely information dissemination (Heflin et al., 2003). All the tests are designed to examine whether there is a change of level of transparency and investor behaviour that eventually changes the market efficiency after the legal reform to IRF. The trend of returns measured from the changes in index return (average daily market return) may be less volatile and should show noise if the market becomes more efficient.

Findings

The findings from the DID analysis indicate significant changes in the information content and timeliness for mandatory adopters after controlling for the early adopters. When information content is timelier, it may indicate that more news being released to public investors and thus, increases the level of transparency in financial market. The changes in the information content and timeliness may trigger investors' reaction in investment decisions, thereby leading to adjustments equity prices and market efficiency. From the Heckman's DID model analysis, the average treatment effects on mandatory adopters have been negative and significant. The results are supported by other matching methods and the cross-sectional regression approach of DID, which reports a larger in magnitude and significant contribution of relevant information to the total information environment for mandatory adopters of quarterly reporting, in the post-legal reform period. The results support the first hypotheses that the higher reporting frequency results in higher information content and timeliness. The legal reform to IRF has been effective in improving the firm level of transparency and enhancing market efficiency.

However, the robustness test shows mixed results for the effect of legal reform to IRF on equity prices and investor behaviour. The firm-year pooled cross-sectional analyses shows supportive results to the main analysis with evidence that there are changes to the market efficiency after legal reform to IRF due to changes in the information content and timeliness. Nevertheless, the individual firm-year analyses show mixed results because the significant results were only present in the ‘clean’⁵ year of 2002; whereas 2001 is a year in global financial crisis where no effect is shown.

However, the mandatory adopters (MA) with December financial-year-end show ambiguous results of regressions. The crisis effect shows mixed test results in years 2000 and 2002 show significant changes in content and timeliness, but this is not the case in years 2001 and 2003. Moreover, the test of information timeliness reports a reduction in information gap between informed and uninformed traders. This is examined by lower abnormal returns around the second and fourth quarter earnings announcement and financial report dates of the post-legal reform period than pre-legal reform period. This supports the second hypothesis that after the legal reform to higher reporting frequency, the information timeliness has been improved.

1.5 Thesis Structure

The structure of this thesis is as follows: Chapter 2 provides the institutional background with some legal environment and background information on Malaysia. Chapter 3 documents prior

⁵ Clean year in this case refers to a year that is outside the transition period of legal reform to IRF and falls within a non-crisis period.

studies in the areas of disclosure frequency, the usefulness of periodic financial reporting and information timeliness for developed and emerging economies, Chapter 4 discusses the theories and mechanism applied in this study, which covers the hypotheses development. Chapter 5 discusses the research design, methodology and sample data. Chapter 6 discusses the methodology, data analysis and the findings of increased information content and timeliness. Chapter 7 presents the overall conclusions and discusses on the limitations and future research.

CHAPTER 2 INSTITUTIONAL BACKGROUND

- 2.0 Institutional Background
- 2.1 Introduction
 - 2.1.1 The Legal System and the Role of Government in Malaysia
 - 2.1.2 Pre-Crisis Economic Environment
- 2.2 Corporate Governance in Malaysia
- 2.3 Revolution of Disclosure Regime in Malaysia: Shifting from MBR to DBR
- 2.4 The New Listing Requirements on Quarterly Reporting
 - 2.4.1 The Reporting Deadline and Penalty
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- 2.5 Summary

2.0 INSTITUTIONAL BACKGROUND

2.1 Introduction

This section presents the institutional background of Malaysia. It explores the legal system, the role of government, the evolution of the disclosure regime and the corporate governance environment in this emerging economy. The content of quarterly reporting, the submission deadline and the penalty on late / non-submission of this report are discussed in detail under the new listing requirements on quarterly reporting (Section 2.6).

2.1.1 The Legal System and the Role of Government in Malaysia

Malaysia's legal system, as a former British colony, originates in the English common law system. This legal system has been a transposition of the system administered by Judges and Lawyers from England since 1786. Since 1898, every company has to register with the Registrar of Companies (ROC). Malaysia's Parliament passed the Companies Act in 1965, the primary act for governing companies. This is based on the English Company Act, 1948 and Australian Uniform Companies Act, 1961 (Pillai, 1984), which has a detailed text with more than 370 Sections and Nine Schedules. Most of the common law regime countries are said to have a stronger corporate governance system in place than non-common law regime countries. Malaysia has comprehensive laws in shareholder and creditor rights protection among those of Organization for Economic Co-operation and Development (OECD) countries (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1998).

The role of the regulator of the financial market can be crucial in developing a credible system. In Malaysia, the Securities Commission (hereafter named SC) was formed in March 1993, a government statutory body that is funded by market levies. It is administered by the Ministry of Finance and has more administrative autonomy than judicial powers (Walter, 2008). Its members include public and private sectors representatives. SC is the principal regulatory authority in-charge of security industry and it supersedes Bursa Malaysia. Bursa Malaysia is the Exchange that prescribes listing requirements, guidelines and practice notes, and is empowered to enforce them (Shim, 2006). Other major authorized forces for good governance are Bank Negara Malaysia (BNM) and the Police.(Securities Commission, 2005h; Shim, 2006).

In Malaysia, those who have access to inside information are prohibited from trading and communicating such information to others. In general, any breaches of rules and regulations are subject to criminal sanctions, civil sanctions and/ or administrative penalties depending on the statements given in the Securities Industry Act (SIA). Any failure to comply with listing requirements may result in sanction of suspension of trading or de-listing (chapter 16 in Listing Requirements of Bursa Malaysia), reprimand or fine up to Malaysia currency RM1million dollars or both under section 11 of SIA. (Bursa Malaysia, 2009a).

2.1.2 Pre-Crisis Economic Environment

During 1990s, Malaysia was recognized as ‘the best development success story’ among emerging East Asia Country before the onset of the mid-1997 Asian financial crisis. The country had managed to grow rapidly with an average rate of 8% annual expansion, growth in employment, prompt payment to external debts, equal distribution of income and living standard with low

inflation (Athukorala, 2001). The Malaysian government had reduced the incidence of poverty (based on income level) among all households by almost half from 18.4% in 1984 to 9.6% in 1995 (Athukorala & Menon, 1995). The country has adjusted well on racial imbalance, on top of providing political stability and policy continuity (Athukorala, 2001) while pushing on a rapid growth of economics. However, there were certain shortcomings of the policy regime being overlooked and not attended to during this high growth period after 1987 that had led to the exploration effect of 1997 financial crisis.(Athukorala, 2001).

2.2 Corporate Governance in Malaysia

Corporate governance in Malaysia has been defined in the Report on Corporate Governance (2002) as “a process and structure used to direct and manage the business and affairs of the companies towards enhancing business prosperity and corporate accountability with the ultimate objective of realizing long term shareholder value, while taking account the interests of other stakeholders” (FCCG, 1999). In short, it can also be illustrated as a relationship between shareholders, board of directors, management and other stakeholders in determining the future direction and performance of the firms (Monks & Minow, 2001).

Corporate governance in Malaysia is related to the interplay of historical, cultural economic and political factors. One of the main ideas of the statutory and non-statutory reforms that have taken place in Malaysia aims to promote directors’ and officers’ accountability and fairness towards external stakeholders or minority shareholders.

Highly concentrated family ownership may cause expropriation of outside shareholders' interest. In Malaysia, large public listed companies (PLCs) mostly have concentrated ownership and almost one third of the CEOs are from the founding family (Nam & Nam, 2004). Even the board is mostly represented by family members and related parties. Since the financial crisis was said to have triggered the governance crisis, the extensive corporate governance reforms such as clear disclosure of related party transactions and so on are to curb further stealing from minority interests and other stakeholders. For instant, investors are updated more frequently with quarterly financial reports, rather than bi-annually. Management may therefore have less time for earnings management⁶. Proper monitoring from institutional shareholders or audit committees may help to mitigate the risk of asset tunneling. This has led to establishment of a monitoring body, Minority Shareholder Watchdog Group, in 2002 (Abdul Wahab, How, & Verhoeven, 2007).

Very few studies have been carried out on the effectiveness of corporate governance legal reforms in Malaysia. Ooi and Visaltanahchoti's (2005) study on the impact of corporate governance legal reforms on equity return in Malaysia after the period of 1997/1998 financial crisis shows a positive association between the quality of corporate governance and stock performance before the Asian financial melting down, but there is no evidence on this relationship during the transition period. They document that firms with a better quality of corporate governance are more profitable, maintaining lower leverage and offering higher stock return. They conclude that after the crisis, the legal changes have restored investors' confidence with significant improvement in stock return (Ooi & Visaltanahchoti, 2005). Another study on the impact of best practice of the Malaysian Code on Corporate Governance (MCCG) and the function of the Minority

⁶ Earnings Management refers to those manipulative activities in reporting by management trying to cover for unfavorable operating performance (Leuz, Nanda, & Wysocki, 2003).

Shareholders Watchdog group has documented significant results from a strengthened relationship between institutional investor (Employees Provident Fund) and corporate governance after the legal reforms (Abdul Wahab et al., 2007). The negative effect of political connection on firms' corporate governance has been mitigated by increased institutional ownership. Since the establishment of Minority Shareholder Watchdog Group, in year 2002, equity prices have averagely increased by 4.8% (Abdul Wahab et al., 2007). This is measured based on the estimated correlation of the changes to the corporate governance index and the stock performance multiplied by the average increase in the corporate governance index, an index constructed by using the 30 provisions of MCCG. (Abdul Wahab et al., 2007).

Table 1 on page 37 summarizes the range of changes introduced for four years since the July 1997. The details of changes in rules and regulations in Malaysia between years 1997 and 2001 are set out in Appendix I. From Table 1, it is obvious that the adoption of mandatory quarterly reporting is the first legal reform to financial reporting that took place after the enforcement of the 1998 capital controls. The introduction of quarterly reporting has required public listed firms to provide an additional flow of information to the market which will impact on the total information environment. It is one of the changes of regulation of corporate transparency that can be relevant to the overall market transparency and market efficiency. Moreover, mandatory listing requirement in Malaysia is enforced with compulsory compliance and there is high litigation risk for non-compliance.

Table 1
Summary: Changes in Rules and Regulations
Period: 1997-2001

1997	July	Asian Financial Crisis starts
1998	April 01	Amendment of Security Act 1983 on Insider trading
1998	May 01	Security Industry act 1998- Reporting of Substantial shareholdings
1998	July 02	Strengthen listing rules on related party transaction
1998	September 01	Capital Controls implemented
1999	March 26	Release of Finance Committee Report on Corporate Governance
1999	June 15	Security Industry Act 1999 (Compliance with Approved Accounting Standards)
1999	January 01	Revamped of Malaysian Code on Takeover and Mergers
1999	July 31	Mandate Quarterly Reporting & early release of Audited Annual Report
1999	December	Equity participation by independent directors
2000	January 01	Shifting from Merit-Based Regime to Disclosure-Based Regime: Phase 2
2000	March	Introduction of Malaysian Code on Corporate Governance
2000	July 01	Law amendment to harmonize the regulatory regime for prospectus
2001	January 01	Shifting from Merit-Based Regulation to Disclosure-Based Regulation: Phase 3
2001	February 15	Major Revamp of KLSE listing requirements - Maintenance of financial condition
2001	June 01	Major Revamp of KLSE listing requirements (with compulsory disclosure) - The Malaysian Code on Corporate Governance (for FYE after 30 June 2001). - The state of Internal Control (for FYE after 31 December 2001).
2001	July 01	Commencement of Operation of Minority Shareholder Watchdog Group

* Refer to Appendix 1 for the Details of Major Changes in Rules and Regulations in Malaysia.

2.3 Evolution of Disclosure Regime in Malaysia

Shifting from Merit-Based to Disclosure-Based Regulation

In the early 1990s, many emerging financial markets were still operating under the Merit-based regime. Those countries included Malaysia, Korea and Mexico, *inter alia*. Under the Merit-based regime (hereafter named MBR), the authorized party, such as the Securities Commission would assess the firms intended to go public to ensure that these firms were in good shape before the securities were issued or listed on the market. The motive for shifting from MBR to DBR (Disclosure –Based Regime) was to pass on the accountability of merit offerings to issuers so that the issuers would directly report to the investors. The authority leaves the merit of offerings to the investor for their decision-making based on information provided (Refer to Table 2). Under DBR, the company discloses timely quality material information for user of information to judge if there is a good investment opportunity. The main objectives are to promote greater transparency and empower investors with more quality information. A higher quality of disclosure may lead to significant enhancement in share performance (Mitton, 2002).

The Securities Commission of Malaysia has gradually implemented DBR from 1 January 1996 to 1 April 2003. There are three phases in shifting from the merit-based regime to DBR: from January 1996 to 1999 for phase 1; the year 2000 for phase 2; and January 2001 to April 2003 for phase 3 (Refer to table 2). In the initial stage, DBR focused on fund raising in capital markets, in which changes were made to new issues or offers, where the continuous disclosure of material information has been required in Issues Guidelines since 01 January 1996. However, the issuers have no obligation to continuously disclose the material information to investors subsequent to its

issue of a prospectus. Therefore, the investors that trade in the open market would not be protected by the disclosure requirements for relevant information in investment decisions (Salim, 2001) at the early stage. However, over time the continuous disclosure for listing firms under listing requirements has been expanded into a more comprehensive structure. The main disclosure requirements under Bursa Malaysia Listing Requirements for Main Market consist of immediate disclosure requirements, periodic disclosure requirements, circulars, etc. The six specific policies concerning disclosure under corporate disclosure policy are: (1) Immediate disclosure of material information; (2) thorough public dissemination; (3) clarification, confirmation or denial of rumors or report; (4) response to unusual market activity; (5) unwarranted promotional disclosure activity⁷; and (6) insider trading. (Bursa Malaysia, 2009a). Overall, the changes in the information environment are said to have improved market efficiency, resulting in lower information asymmetry through changes in the regulation regime.

Table 2
Comparison of Securities Offerings in the Primary Market under MBR and DBR

MBR	DBR
Authorities regulate <i>securities offerings</i> (Onus on authorities)	Authorities regulate <i>disclosure of information</i> in securities offerings (onus on issuers and advisers)
Issuers and advisers disclose to <i>authorities</i>	Issuers and advisers disclose to <i>investors</i>
<i>Authorities review</i> investment merits of offerings	<i>Investors determine</i> investments merits of offerings

Source: (Securities Commission, 1999j)

⁷ Unwarranted promotional disclosure activity refers to any disclosure activity that is unnecessary to inform investors. It is self-promotional and such disclosure is considered with attempt to mislead investors and cause unwarranted price movement, e.g. inappropriately-worded news release and exaggerated report or prediction.

Table 3
Time Frame and focus of Three Phases in DBR

Phase 1	1996 -1999	Flexible MBR with <u>enhanced</u> disclosure, due diligence and corporate governance. There are major changes introduced to Issues Guidelines, where the Securities Commission (SC) stopped setting the price for new issues and flexibility allowed to issuers or their advisers/ underwriters to price the IPO and rights issues on market-driven basis. It states the details of requirements for corporate proposal to practice by listed companies.
Phase 2	2000	Hybrid MBR and DBR <u>further emphasis</u> on disclosure enhancement, due diligence and corporate governance as well as promotion of accountability and self-regulation. Phase 2 is an implementation program. In this phase, SC would not intervene the corporate proposal as long as it is prepared in compliance with the “Policies and Guidelines on Issue/ Offer of Securities” on pricing of securities, valuation of assets and utilizations of proceeds. It was geared more towards promoting accountability and self-regulations.
Phase 3	2001-2003	Full DBR with <u>high standards</u> of disclosure, due diligence, corporate governance as well as exercise of self-regulation and display of responsible conduct. In this phase, the SC evaluated the corporate proposal wholly in terms of quality of information disclosed.

Source: (Securities Commission, 1999j)

2.4 The New Listing Requirements on Quarterly Reporting

After the Asian Financial Crisis of 1997-1998, among the changes are two major foci that are widely discussed in the last decade, including continuous disclosure and information timeliness. As recommended in the Finance Committee Report on Corporate Governance (1999), corporate accountability should be improved by having “timely disclosure of adequate, clear and comparable information concerning corporate financial performance, corporate governance and corporate ownership” (Securities Commission of Malaysia, 2008a). The Securities Commission

has first revamped the listing requirements by implementing quarterly reporting with effect from 31 July 1999 (Securities Commission of Malaysia, 2008b), which public listed firms are required to file quarterly reports within two months from the balance sheet date of each quarter ended. Additionally, firms are required to release annual audited accounts, directors' and auditors' report within four months from the financial year ending as opposed to six months (Bursa Malaysia, 1999).

2.4.1 The Content of the Interim Report

Initially, in the preparation of quarterly reporting, public listed companies were required to prepare the financial statement according to approved accounting standards and the explanatory notes in accordance to Part A of Appendix 9B of the listing Requirements of Bursa Malaysia. The quarterly report should contain the balance sheet, income statement and explanation notes. Bursa Malaysia later amended the KLSE listing rules in conjunction with Malaysia Accounting Standard Board (MASB) to adopt *MASB 26 : Interim Financial Reporting (effective from 1 July 2002)* to include a cash flow statement and a statement of changes in Equity (Securities Commission of Malaysia, 2008b). On 1st January 2006, MASB 26 was replaced by the new and revised FRS 134 as a result of international convergence of accounting standards, which requires the accounting policies applied in interim report to be the same as annual reports to which the interim period belong (Abdul Rahman & Ismail, 2008).

The financial statements should follow the approved accounting standards and the explanatory notes are in two parts as below:

- (1) Part A is to be prepared in compliance with the requirement of FRS 134: Interim Financial Reporting and Paragraph 9.22 of listing requirements of Bursa Malaysia Securities Limited.
- (2) Part B is to be prepared in pursuant to Appendix 9B of the listing Requirements of Bursa Malaysia (Bursa Malaysia, 2009a).

2.4.2 The Reporting Deadline and Penalty

Publicly listed companies were required to submit quarterly reports within two months of the quarter ended on or after 31 July 1999 (Bursa Malaysia, 1999). If the quarterly report is not submitted on time, the company must make an immediate announcement to the Exchange. The listing of those companies failing to issue their quarterly report three months after the expiry may be suspended. If they are still not able to issue the report on the seventh day prior to the expiry of the suspension deadline, an immediate announcement must be made on that particular day to the Exchange. The company which cannot issue the quarterly report within six months from expiry day may face de-listing procedures (Bursa Malaysia, 2009a).

2.5 Summary

In response to the 1997/1998 Asian financial crisis, the Malaysian government announced an agenda⁸ of corporate governance reforms following the Finance Committee Report on Corporate Governance 1999, which has covered comprehensively from regulatory reforms to institutional reforms, and introductions of best practices to the relevant industry. The main objectives are to enhance shareholder's protection, increase transparency, strengthening regulatory enforcement, accountability of directors, and promoting training education for directors (Securities Commission of Malaysia, 2008a).

This thesis specifically sheds light on one of the corporate governance initiated legal reforms, the increased frequency of periodic reporting. The purpose is to identify how the quarterly reporting, which forms part of the requirement under continuous disclosure regime, was able to promote effectively on better level of corporate transparency and market efficiency in the Malaysian financial market during and after the financial crisis period.

⁸ The list of the corporate governance legal reforms program has been attached in Appendix 1.

CHAPTER 3 LITERATURE REVIEW

- 3.0 Literature Review
- 3.1 Introduction
 - 3.1.1 The Differences between Emerging Economies and Developed Economies
- 3.2 Prior Studies on Disclosure Frequency
 - 3.2.1 Studies on Developed Economies
 - 3.2.2 Studies on Emerging Economies
 - 3.2.3 Literature gaps
- 3.3 The Costs and Benefits of Higher Reporting frequency
 - 3.3.1 Costs of Reporting and Private Information
 - 3.3.2 Aggregate Earnings and Confirmative Disclosures
- 3.4 Online Continuous Disclosure and Information Timeliness
- 3.5 Summary

3.0 LITERATURE REVIEW

3.1 Introduction

No consensus has been established on the usefulness of quarterly reporting in developed economies. Previous studies present the evidence of increasing usefulness of earnings announcements and periodic financial reporting to public investors, which results in increasing price reaction to the “new news” at earnings announcement date (Beaver, 1968; Buchheit & Kohlbeck, 2002; Emanuel, 1984; Fu, Kraft, & Zhang, 2012; Landsman & Maydew, 2002; May, 1971; Truong, 2010, 2012). Prior to the continuous disclosure regime, periodic earnings announcements and reporting could be one of the most useful and reliable resources for investors to gather financial information for decision making (Beaver, Lambert, & Morse, 1980). The information derived from earnings announcements may result in variability of equity returns surrounding the earnings announcement period relative to the period when there are no announcements (Beaver, 1968; May, 1971). However, under continuous disclosure regime, information provided in the quarterly report is claimed as periodic⁹ instead of timely as compared to certain immediate disclosures required by listing requirements, such as announcement of firm-specific news or material event (Ball & Shivakumar, 2008). There is possibility that information is disseminated via other information channels even before the earnings announcement date. This may reduce the value relevance of information released on the announcement date. Thus, earnings announcements today are considered moderate (Ball & Shivakumar, 2008) or less informative than other continuous disclosures in certain developed economies. Indeed, there is evidence that

⁹ Periodic information in this sense refers to financial information regarding a firm’s performance that is produced by management at regular intervals for business operation control purposes and to report to the directors and shareholders of the firm. Such information is normally financial elements that are contained in the balance sheet, income statement and cash flow. The periodic report is also one of the continuous disclosures.

shows a declining trend in value relevance¹⁰ of information obtained from earnings announcements (Butler, Kraft, & Weiss, 2007; Collins, Maydew, & Weiss, 1997).

This section reviews previous studies that discuss the usefulness and consequences of higher reporting frequency in developed and emerging economies. The differences of institutional characteristics of developed economies and emerging economies, and the possible impacts from IRF are discussed next. The outcome of legal reform to IRF may be influenced by legal structure of an economy and different characteristics of firm, such as ownership structure concentrated. The study also highlights on the costs and benefits of practicing higher reporting frequency from both management and investors perspectives.

3.1.1. The Differences between Emerging Economies and Developed Economies

Emerging versus Developed Economies

Some legal enforcements in developed economies may have different influences in the emerging economies (Budsaratragoon et al., 2012). Emerging economies are different from developed economies in many areas. First, emerging economies are less efficient in incorporating information into prices than emerging markets (K. Lim & Brooks, 2010a). This may be explained by their economic characteristics that affect the valuation of firm, in terms of transparency, liquidity, contagion, governance and corruption (Bruner, Conroy, Estrada, Kritzman, & Li, 2002), which differ emerging markets from the developed markets. Previous empirical studies confirm this expectation that on average, developed markets are more efficient than emerging markets

¹⁰ Information is considered relevant if it is significant enough to influence the investor's decision. Value relevance of information is therefore referring to the level of materiality and timeliness of information.

(Fernandes & Ferreira, 2008; Griffin, Kelly, & Nardari, 2007; Jin & Myers, 2006). Therefore, it may be more appropriate to consider the unique characteristics of an economic environment in an emerging country before adopting any regulation that is enforced in a developed country system (Budsaratragoon et al., 2012).

Emerging economies are relatively less efficient than developed economies (Bekaert & Harvey, 2002; Griffin et al., 2007; Jin & Myers, 2006; Morck, Yeung, & Yu, 2000). According to Morck, Yeung and Yu (2000), firms in low-income economies have higher auto-correlation in their equity returns. The serial correlation can be explained by infrequent trading and slow adjustment to the latest information (Bekaert & Harvey, 2002), which resulted in price moving synchronously. For example, China, Malaysia and Poland have 80% of traded stocks moving in the same direction in a given week relative to 57% in developed markets such as the U.S. (Morck et al., 2000). Emerging economies are less likely to be intensively affected by firm-specific news announcement, therefore less informationally efficient than developed economies. (Bekaert & Harvey, 2002). However, Griffin et al. (2007) also document that individually, some emerging markets appear to be as efficient as (or even more efficient than) certain developed markets (Griffin et al., 2007; Lim & Brooks, 2010b). They compare the post-earnings announcement drift of the semi-strong form efficiency firms and find similar results in abnormal returns for some emerging and developed markets. Their evidence shows that legal, regulatory and governance characteristics may not be related to a higher level of informational efficiency. (Griffin et al., 2007).

Second, the practices of asset valuation in emerging markets vary more widely (Bruner et al., 2002) within the country and therefore are less standardized. In addition, the fast-growing economy in emerging markets may also indicate a high demand for funds. Due to their higher country risk, they normally offer higher returns. (Bruner et al., 2002). Some economies even offer real rates of two-three times those observed in developed countries (Bruner et al., 2002), which has drawn more attention from international investors. Table 4 presents the comparison of developed economies and emerging economies in term of their different economic characteristics. The third column highlights the possible changes from higher frequency in financial reporting on the emerging economies.

Table 4
Emerging Economies versus Developed Economies: From Economic Perspectives

Characteristic	Developed Economies	Emerging Economies	Possible changes with quarterly reporting on emerging economies
1. Economic Growth & Financial Market	<ul style="list-style-type: none"> - More widely held firms (financial and large firms) in certain developed economies like UK and Ireland; some economies in continental Europe have large shareholder control (more non-financial and small firms)¹¹ - High-income countries; firms with stock prices moving in unsynchronized manner¹² - More predictable economy - On average, stronger form of market efficiency¹³ - Higher shareholder rights protection against insider trading is correlated with higher market efficiency²⁰ 	<ul style="list-style-type: none"> - More ownership concentration structure like state control firms, small firms with family control and privatized infrastructure firms - Middle and low-income countries¹⁴ ; firms with stock prices move more synchronously¹⁹ - More volatile¹⁵ market and business cycle with more crisis prone²²; unpredictable economy¹⁶ - On average, weaker in market efficiency²⁰ - Shareholder rights protection is lower with weaker corporate governance, leading to lower market efficiency²⁰ 	<ul style="list-style-type: none"> - Market becomes more predictable and less volatile - Improved market efficiency

¹¹ (Faccio & Lang, 2002)

¹² (Bekaert & Harvey, 2002; Griffin et al., 2007; Jin & Myers, 2006; Morck et al., 2000).

¹³ (Fernandes & Ferreira, 2008; Griffin et al., 2007; Jin & Myers, 2006).

¹⁴ (Cuadra, Sanchez, & Sapriza, 2010)

¹⁵ (De Santis & Imrohoroglu, 1997)

¹⁶ (Movassaghi, Bramhandkar, & Shikov, 2004)

Table 4 (Con't)

Characteristic	Developed Economies	Emerging Economies	Possible changes with quarterly reporting on emerging economies
2. Institutional factors & Policy making	<ul style="list-style-type: none"> - Government is independent of firm's performance; firms are more towards self-regulated - Implement either countercyclical fiscal policies¹⁷ 	<ul style="list-style-type: none"> - Government plays an important role in economic activities; Institutional integrity is counted in the capital market¹⁹; Uncertainty in social, legal, political - Procyclical²⁰ fiscal policy 	<ul style="list-style-type: none"> - Government responds to crisis with mandatory enforcement²²
3. Debt Default risk	<ul style="list-style-type: none"> - Less likely (extremely rare) for government debt to be in default, even though some (e.g. Greece and Ireland) had problems after 2007-2008 crisis¹⁸ 	<ul style="list-style-type: none"> - Higher default risk in government debts; facing countercyclical interest rate spreads in international credit limit market, characterized by countercyclical default risk¹⁵ 	<ul style="list-style-type: none"> - Quarterly reporting increases the financial transparency²³ to debt holders at firm level and market level; theoretically, higher transparency may encourage efficient investment²⁴.
4. Currency & Inflation	<ul style="list-style-type: none"> - Less fluctuation in currency movement and inflation under control 	<ul style="list-style-type: none"> - More fluctuation in currency movement; and the inflation is more positively affected by inflationary shocks.²¹ 	

¹⁷ (Cuadra et al., 2010). According to Keynesian model, the government that based on countercyclical fiscal policy should reduce (increase) public expenditure and increase (reduce) tax rates in a good (bad) time. (Cuadra et al., 2010).

¹⁸ (Candelon & Palm, 2010)

¹⁹ (Li, Morck, Yang, & Yeung, 2004; Salomons & Grootveld, 2003).

²⁰ (Cuadra et al., 2010). Procyclical is the opposite to countercyclical fiscal policy (refer to note 22 above) (Cuadra et al., 2010).

²¹ Where inflation shocks have stronger impact on inflation uncertainty (Daal, Naka, & Sanchez, 2005).

²² This is in contrast to Griffin et al., (2007) argument and findings, where legal, regulatory and governance characteristics may not be related to a higher level of informational efficiency.

²³ Lack of transparency may lead to lower market efficiency (Jin & Myers, 2006).

²⁴ (Durnev, Morck, & Yeung, 2004).

Table 4 (Con't)

Characteristic	Developed Economies	Emerging Economies	Possible changes with quarterly reporting on emerging economies
5. Trend of Foreign Investments	- Significant capital flight to emerging countries ²⁵ that generates fast growth and high returns, results in capital outflow; the trend might be strongly driven by degree of public shareholder rights protection in foreign countries ²⁶	- Foreign investors are more interested in emerging markets due to higher returns ²⁷ on risk taken, which stimulate market liquidity and enhance the capital access	- More frequent earnings announcements and reporting allow higher investor rights protection, which is to the benefit of investors, especially to foreign investors that are less informed relative local investors

Note 2 and 3 in Table 4 shows that in emerging economies, the fiscal policy follows a procyclical behaviour, which means the government increase (decrease) the public spending and lower (higher) the tax rates in good (bad) time. Nonetheless, from the business cycle perspective of emerging economics, the behaviour of interest rate spreads is linked to countercyclical default risk, where external borrowing becomes more expensive during bad time. (Cuadra, Sanchez and Sapriza, 2010).

Since there are specific differences in the economic and institutional environment of the emerging economies relative to the developed economies, the mandatory changes to higher reporting

²⁵ (Movassaghi et al., 2004).

²⁶(Leuz, Lins, & Warnock, 2010). Leuz et al., (2010) state that investors from U.S have lower foreign investment in countries with weaker investor protection.

²⁷ (De Santis & Imrohoroglu, 1997).

frequency are expected to have some different influences on information environment and investor behaviour in the emerging societies.

3.2 Prior Studies of Disclosure Frequency

The effectiveness of higher reporting frequency may be subject to the institutional environment and the level of market efficiency of an economy. A cross-country study of 24,500 firms from 39 countries from 1988-2007 to test on the impact of increased reporting frequency (hereafter IRF) on equity price and liquidity documents significant results on developed markets or countries with higher investor rights protection (Yang, 2009). However, there are mixed results obtained for emerging markets. Results for emerging countries with higher reporting frequency but lower level of investor protection show no such significant impact of IRF on equity price and liquidity. The key determinant of the consequences of higher reporting frequency in this case is the underlying legal structure of an economy. (Yang, 2009). Therefore, the results of the effect of IRF could be different in developed markets and emerging markets.

Next, the effect of IRF on information environment could also be multi-dimensional, where the outcome of a test on the relation between higher reporting frequency and information asymmetry can be different depend on the disclosure attribute. For instance, given that more detailed disclosure (greater in quantity) of information should reduce information asymmetry, recent empirical evidence on 386 firms in United States documents that monthly revenue (rather than four quarter reports) does not significantly influence on information asymmetry among investors (Buskirk, 2012). This study focuses on how frequency of periodic reporting that provides timelier cumulative and confirmative financial information may improve information environment and the

level of market transparency by changing the information asymmetry. The selected Difference-in-differences methodology allows one-dimensional test of the increased timelier content due to legal reform to IRF.

3.2.1 Studies on Developed Economies

Some recent studies of developed economies have presented evidence on the benefits of higher reporting frequency to public investors (Butler et al., 2007; Fu et al., 2012; Truong, 2012).

Value Relevance of Periodic Report

Higher reporting frequency may increase the value relevance of information via earlier distribution of news. Value of information can be assessed based on its ability to change the decision of investors (Beaver, 1968). Using the two metrics of Beaver (1968), abnormal trading volume and abnormal return volatility, and a sample of 1000 firms in U.S. for year 1972 to 1998, Landsman and Maydew (2002) suggest an increase in informativeness of quarterly earnings announcement over three decades. Evidence also suggests that the magnitude of the market response to earnings announcement increases non-linearly with the magnitude of unexpected earnings (Basu, 1997; Freeman & Tse, 1992). In contrast, Francis, Schipper and Vincent (2002b) perform a study over 1980-1999, and find no evidence of this relationship including the intensity of average investors' reaction to these announcements (Francis, Schipper, & Vincent, 2002b).

Collins et al. (1997) demonstrate that there is a decline in value-relevance for ‘bottom line’²⁸ earnings over the test period of 1953-1993 (forty years). However, the combined value-relevance of earnings and book values, in particularly the value-relevance of book value, has not declined. In fact, it has slightly increased. For example, more frequent report may alert investors from any negative net present value (NPV) investment projects (Gigler, Kanodia, Sapra, & Venugopalan, 2014). The shift from earnings to book value may be due to the increase in the frequency and magnitude of non-recurring items and the increased frequency of negative earnings reported (Collins et al., 1997). Therefore, other than earnings, the market also reacts to the other detailed information in the quarterly reporting.

If increased reporting frequency may cause early arrival of news to public investors, there should be an increase in information content. A recent study by Truong (2012) on New Zealand economy demonstrates that over time, the information content of earnings announcements has increased significantly (Emanuel, 1984) under both interim and annual reporting system over a period of 16 year. In contrast, a recent study over the period from 1972 to 2006 reports little supportive evidence on U.S. markets (Ball & Shivakumar, 2008). Ball and Shivakumar (2008) show that quarterly earnings announcement has provided a modest increase in information content, with an approximately 1% to 2% of new information increase to the market. They argue that the role may lie elsewhere, such as in credit assessment for debt settling and contracted compensation, confirming prior information and providing managerial forecast (Ball & Shivakumar, 2008). However, it provides a more comprehensive update of a firm. If the periodic financial disclosure

²⁸ The earnings after accounting for discontinued operation, special items and extraordinary items (Collins et al., 1997).

has no beneficial role in the developed (strongly efficient) markets, the role may lie somewhere in the less developed markets (Verrecchia, 2001).

Timeliness

An early study by May (1971) shows that there are greater price changes in the week of earnings announcements of four-quarter reporting regime than bi-annual reporting regime. Nonetheless, the study finds that the relative price-change responses to quarterly earnings are not significant when compared to annual returns. This may be due to lack of awareness of the usefulness of quarterly and annual financial reports. (May, 1971).

Bushman, Chen, Engel and Smith (2004) report that concentration of ownership, directors' and executive's equity-based incentives and independent directors' reputation vary inversely with earning timeliness, but the concentration of ownership, and both the directors' and executive's equity-based incentives increase with firm complexity . They find insignificant results on board size and the percentage of non-independent directors with earnings timeliness of interim reports. (Bushman, Chen, Engel, & Smith, 2004).

A more recent study by Butler, Kraft and Weiss (2007) finds little evidence on the mandatory effects of reporting frequency on speed of information incorporated into share prices, but significant for voluntary adopters. The sample covers 28,824 reporting-frequency observations for a period over 1950-1973 in the United States.

Forecast Accuracy

Accuracy of analysts' forecasts can be important to performance measurement. In the 1990s, a trend was observed towards greater management rewards for meeting analyst forecasts relative to increasing profit. This has drawn the focus of firm management to analyst forecasts and has indirectly resulted in increasing accuracy and precision of financial analyst forecasts. (Brown & Caylor, 2005). In this situation, management may choose to provide more private information to financial analysts for a better forecast.

The legal reform to IRF has indeed provided a better platform for management to communicate with outside analysts via more frequent public announcements. However, a change in regulation on fairer disclosure may not necessarily improve the accuracy of analyst forecasts (Heflin et al, 2003). Moreover, it is arguably that if the management intends to follow the forecasts from the analysts, analysts provide competitive reports which may reduce the usefulness of earnings announcement (Francis, Schipper, & Vincent, 2002a).

Information Asymmetry

Increased reporting frequency may improve the level of information asymmetry and hence lower the cost of capital. For example, Fu, Kraft and Zhang (2012) using hand-collected data on firm's interim reporting frequency from 1951 to 1973, show significant results on higher reporting frequency lowering the information asymmetry and cost of capital for both voluntary and mandatory adopters. This is supported by empirical evidence from Butler et al. (2007) that report increased reporting frequency voluntary improves timeliness.

3.2.2 Studies on Emerging Economies

To date, very few studies have been performed on usefulness of quarterly reporting in emerging economies. So far, most of the research done in emerging economies are related to the annual and bi-annual reporting and earnings announcements, except for cross-countries study performed by Yang (2009) and studies on Malaysian economy by Ku Ismail and Chandler (2003, 2005 & 2005b).

Studies on Timeliness of Annual reports

A study of Istanbul Stock Exchange (ISE) shows significant evidence of the different effects of information timeliness of annual reporting on different firm characteristics in term of size, increased financial risk and timing of the policy of the past years (Dogan, Coskun and Celik, 2007). They found that emerging markets use the financial information disclosed in the annual financial report as a primary source of information mainly due to slowness in disclosures of emerging markets as compared to developed markets (Dogan et al., 2007). This finding is supported by another study of Greece, information such as earnings disclosed in the financial reports are also found to be far more related to the securities returns in its emerging market relative to the developed markets (Leventis Weetman, 2004). A study of the Chinese market documents that a systematic timing pattern of annual report disclosures can be useful for investor forecasts (Haw, Qi , Wu & Woody,2000). In Zimbabwe, timely information is found essential in curbing insider trading, private information and the uncertainty of news in the market (Owusu-Ansah, 2000). The focus of these studies is mainly on the information timeliness of annual financial statements.

3.2.3 Literature gaps

There is very little research on the quarterly financial reporting in Malaysia. Ku Ismail and Chandler (2003) report that (1) a significant relationship exists between timeliness of the quarterly reports and four company's attributes of size, profitability, growth and capital structure (Ku Ismail & Chandler, 2003); (2) no significant association can be found between the extent of disclosure and firm's profitability and growth, except for leverage (Ku Ismail & Chandler, 2005b); (3) Non-profitable entities tend to defer the reporting of exceptional items to the fourth quarter compared to profitable firms. No significant relationship is noted between the reliability of quarterly reports, proxied by the postponement of exceptional item disclosure, and firm attributes of size, growth and gearing. (Ku Ismail & Chandler, 2005).

No study has examined the effect of mandated quarterly reporting on market behaviour by using the Difference-in-differences (DID) quantitative methodology as employed in this study in the Malaysian context. In the study of Ku Ismail and Chandler (2003), they measure timeliness based on how many days it takes to announce the quarterly report. The longer it takes, the lower the quality of report. Yang (2009), in his cross-countries study, tests on the effect of IRF on equity prices and liquidity by measuring the equity return variation (return synchronicity) using two-factor international model (Morck et al., 2000). Different from these studies, this study estimates the differences of change in information content and timeliness for mandatory adopters after legal reform to IRF (the Difference-in-differences of treatment effect on treated group) using DID approach (Heckman, Ichimura, & Todd, 1998). Further, this study measures the changes of information content from earnings announcement due to higher reporting frequency that contribute to total information environment (Ball & Shivakumar, 2008). When the earnings

announcement returns can explain the annual returns better, the improved information environment may change investor behaviour, thereby change the level of market efficiency of an economy. Moreover, this study evaluates the possible reduced ‘surprises’ at the fiscal mid-year and year-end earnings announcement dates after the legal reform to higher reporting frequency.

3.3 The Costs and Benefits of Higher Reporting Frequency

3.3.1 Costs of Reporting and Private Information

Under a four quarters reporting regime, management may be induced to meet short term targets and become short-termist (Gigler et al., 2014). For example, management may weight more in meeting analyst forecast (Brown & Caylor, 2005) over each quarters than enhancing or maximizing shareholder values. The equity market pricing may reflect the premature evaluation of the managerial action, and thus, project with higher short term benefits may become more attractive than longer term projects (Gigler et al., 2014). This may result in the possibility of management foregoing any profitable projects that could be beneficial to firm over long term. Overall, higher reporting frequency in financial reporting could result a paradigm shift in management focus. From management perspective, it is arguable that the dysfunctional effect of IRF may be positive to ‘price efficiency’ but suffer ‘economic efficiency’ to some extent, in term of losing beneficial long term projects (Gigler et al., 2014).

Further, when the management are mandated to report quarterly on the business operation performance, it may become costly for the management to provide private information to the investors/ financial analysts at the same time. For example, there are disagreements before and

after the enforcement of mandatory quarterly reporting in Malaysia over the direct costs of increased disclosures, particularly for small listed companies (Mak & Lalanika Vasanthi, 2006). There is argument that a requirement of submitting reports within 60 days after each quarter ended has been costly for the smaller entities, in addition to the divergence of management attention from everyday business operations (Mak & Lalanika Vasanthi, 2006). Hence, since the firm's financial information will be announced to public more frequently, management may reduce their private information distribution activities after the legal reform to IRF. However, some believe the cost of quarterly reporting should form part of ordinary costs of being listed (Mak & Lalanika Vasanthi, 2006).

Based on the online survey by CPA Australia and Corporate Governance and Financial Reporting Centre (CGFRC) at the National University of Singapore in 2006, it was found that 71% of Malaysian respondents are supporting the quarterly reporting system, where only one third of Hong Kong and Singapore respondents agreed with mandatory quarterly reporting (Mak & Lalanika Vasanthi, 2006). A possible explanation is due to weaker level of transparency in Malaysia's emerging market than Hong Kong and Singapore's developed markets. Alternatively, a stronger governance system is demanded in the emerging economy of Malaysia.

From investor's perspective, increased reporting frequency should reduce the individual private information acquisition expenditures (Yee, 2004). For example, in acquiring private information, the costs to investors may be reduced in general because of more frequent free access to information. Conversely, the costs to investors may also increase due to the fact that they may have a tendency to acquire private information more often after the switch from two reports to a

four reports regime (Yee, 2004). Yee (2004) reports that the legal reform to higher reporting frequency has indeed reduced the trading disadvantage of less informed investors and also the reporting day price volatility, but not the total expenditure on private information acquisition of investors.

3.3.2 Aggregate Earnings and Confirmative Disclosures

Higher reporting frequency affects the competing information media, such as financial analyst or private information sources (Butler et al., 2007). The timely content in the quarterly reporting may act as a substitute of private information (Butler et al., 2007), on top of a complementary role in confirming the occurrence of events (Gigler & Hemmer, 1998) and provide the current status of these events. It can be a more efficient device in promoting better corporate transparency and information symmetry than other competing sources. For example, some governments increase the reporting frequency with aim to provide more significant information about firm's performance (Beaver, 1968). Even though under continuous disclosures regime, there are immediate announcements made from time to time over the business operation period, information released via immediate announcement is normally quite short and is subject to any subsequent changes to this information in the future.

Since a periodic financial report is prepared under the standards required by law, the cumulative information in the periodic financial report is considered confirmative (Gigler & Hemmer, 1998),

more stable²⁹. A recent research study on the frequency and usefulness of reported revenue in United States documents that, it is not the regular monthly disclosure of revenue but the detailed cumulative revenue (greater quantity) disclosure that is associated with a lower level of information asymmetry (Van Buskirk, 2012). Francis, Schipper and Vincent (2002b) find the concurrent disclosures, especially for the detailed income statements explain the absolute market reaction (Francis et al., 2002b).

Benefits to Stakeholders

Further, the timelier release of new or cumulative information may clear some speculative rumors or information uncertainty on firms' financial status (Ball & Shivakumar, 2008), in particularly during the slow or crisis period of time. The cumulative and confirmative features of information from quarterly reporting have been very important to users of financial reports, particularly the creditors and bankers. The creditors and bankers have to consider a firm's financial stability before approving any new loan application or for the existing debts recovery. Thus, the increased frequency of periodic reporting benefits the stakeholders like bankers and creditors as well.

3.4 Online Continuous Disclosure and Information Timeliness

Debates on whether the quarterly reporting is still providing relevant and timely information as compared to the online disclosures are yet to reach a consensus stage. Due to the advance in technology and public availability of information nowadays, firms are expected to disclose more timely information to users for informed decision making. However, there is no guarantee that the

²⁹ Some events may be one off, for instance a firm under litigation risk. The management may overcome the problem in a short period of time. Some private disclosures may exaggerated and influence the investors' decision. The periodic financial report is said to have captured the confirmed part of information and business actions.

online disclosures have always been useful due to some of the factors that may influence a firm's willingness to update information online in a timely manner. Ezat (2009) explored the key factors that may influence on the information timeliness. The author measures the effect of specific firm characteristics and corporate governance variables on the timeliness of corporate internet reporting for listed Egyptian corporations, reporting that large firms, high liquidity firms, firms whose boards have a large number of directors and a high proportion of independent directors tend to disclose more timely information on their website (Ezat, 2009).

Another study carried out by Ashbaugh, Johnstone and Warfield (1999) examines the firm's use of the internet to enhance the relevance of information. They report that some firms provide more timely information, such as monthly sales, but adversely, some firms disclose outdated information online (e.g. two year old annual report). They notice that the usefulness of financial reporting on the internet depends on the ease of accessing the data, the amount of data disclosed, and whether the user can download and analyse the data. (Ashbaugh, Johnstone & Warfield, 1999).

While many previous studies focus on verifying that large firms reveal the greatest volume of information, Alvarez, Sa'nchez and Domí'nguez (2008) examine whether concentrated industries disclose more information voluntarily as compared to the others. Since the concentrated industries are more political visible, they are more willing to disclose online large amount of information on corporate social responsibility, intangibles and corporate strategy to obtain legitimacy and to avoid the external/ governmental interference (Alvarez, Sa'nchez & Domí'nguez, 2008). In this case, the online financial reporting is no longer neutral and unbiased after considering those economic and social consequences, such as the political costs.

Different from the general online reporting, the focus of this study is on the effectiveness of mandatory quarterly reporting, which the periodic report is made available online in accordance to the listing requirements of the Malaysian stock exchange. The information included in the financial report is prepared in accordance and with compliance to the accounting standards, and the report is published online on the website of Bursa Malaysia which is monitored by the Securities Commissions. Thus, the information provided in this mandated periodic reporting should be more reliable than the voluntary online disclosures; the amount of information included in the periodic report would normally set to fulfill the minimum requirements of the standards, and thus, less bias. This periodic report may be timelier than the voluntary report in the less efficient market environment because there is always a deadline set for each quarter for firms making their earnings announcements. Therefore, the legal reform to IRF is expected to trigger higher information content and timeliness in the setting of an emerging economy, like Malaysia.

3.5 Summary

The usefulness of quarterly reporting has been discussed since the 1930s (Taylor, 1965). The consequences of a change in reporting frequency from two reports to four reports may change the value relevance and the usefulness of the information disclosed in the report, in term of information content and timeliness. The effects may be different for countries with different institutional and firm characteristics. Hence, there could be different outcomes of legal reform to IRF to different countries, such as emerging economies and developed economies.

Studies in developed economies includes those examining the effect of higher reporting frequency on (1) information content; (2) information timeliness; (3) accuracy of analyst forecast; and (4) information asymmetry and cost of capital. However, to date, there are still no consensus findings in the studies on the usefulness of financial disclosures in periodic report. There are very few studies that are related to the impact of firms switching from two reporting regime to four reporting regime in emerging economies.

Studies on the Malaysian economy presented by Ku Ismail and Chandler (2003, 2005 & 2005b) are focusing on three key elements of reporting quality (1) timeliness, (2) extent of disclosure, and (3) reliability of quarterly report due to increased reporting frequency, by examining the relationship of these elements with firm characteristics. This study has taken different approaches to evaluate the effect of increased reporting frequency on market efficiency of emerging economy. After accounting for those possible costs of implementing higher reporting frequency in emerging economy, the cumulative figures and confirmative disclosures in periodic report are expected to benefit the general public investors.

CHAPTER 4 THEORIES & HYPOTHESES DEVELOPMENT

- 4.0 Theory & Hypothesis Development
- 4.1 Introduction
- 4.2 Capital Market Effects of Higher Disclosures and Market Efficiency
 - 4.2.1 Information Content and Equity Prices
 - 4.2.2 Information Timeliness and Investor Behaviour
 - 4.2.3 Information Gap and Information Asymmetry
 - 4.2.4 Effect on Return Volatility
- 4.3 Mandatory Effect of Disclosure Regulation
 - 4.3.1 Theory of Disclosure Regulation
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4.0 THEORY AND HYPOTHESES DEVELOPMENT

4.1 Introduction

Theoretically, from a corporate governance perspective, increased reporting frequency (thereafter named IRF) should increase the level of corporate transparency at both the firm level and the market level. When an individual firm discloses more information to its shareholders and public investors, investors become more informed and the information disclosed may influence their decisions in investment. Thus, increased transparency in business operation and performance may improve the level of rights protection to investors (Leuz et al., 2003).

From an accounting and finance perspective, higher reporting frequency may improve the relevance of information via greater value of content and improved timeliness. Earlier disclosure of financial status and performance, such as reporting at quarter one instead of mid-financial year, may help to prevent the value of information from diminishing over time. This is because the earlier the information is released, the higher the value of this information to users. Also, early arrival of news at quarter one may trigger investors' reaction around quarter one and thereby reduce the information shock at the following quarter, and may resulting one smaller gap between the informed and uninformed investors. With these changes of reporting frequency and information relevance in term of content and timeliness, investors become more confident towards firms and market performance and trade more often. The changes in market behaviour will move equity prices to reflect most information available, thereby changing the market's efficiency. Consequently, improved market efficiency may lower return volatility since there will be reduced information asymmetry between informed and uninformed investors. Again, the reduced

information asymmetry among trades may be able to trigger trading liquidity and lower the cost of equity.

Figure 1 on page 70 shows the mechanism and hypotheses development of this study. Next, Table 5 on page 71 summarizes the mechanism and measurements applied in this study to investigate the effects of higher reporting frequency on market efficiency due to changes in equity prices, investor behaviour and information asymmetry in the emerging market of Malaysia. In the following sections, Section 4.2 discusses theories applied in this study including the development of hypotheses. Further in Section 4.3, the discussions shed light on theory of disclosure regulation, the role of mandatory disclosure and compare mandatory with voluntary disclosures.

Figure 1: The Mechanism and the Hypotheses Development

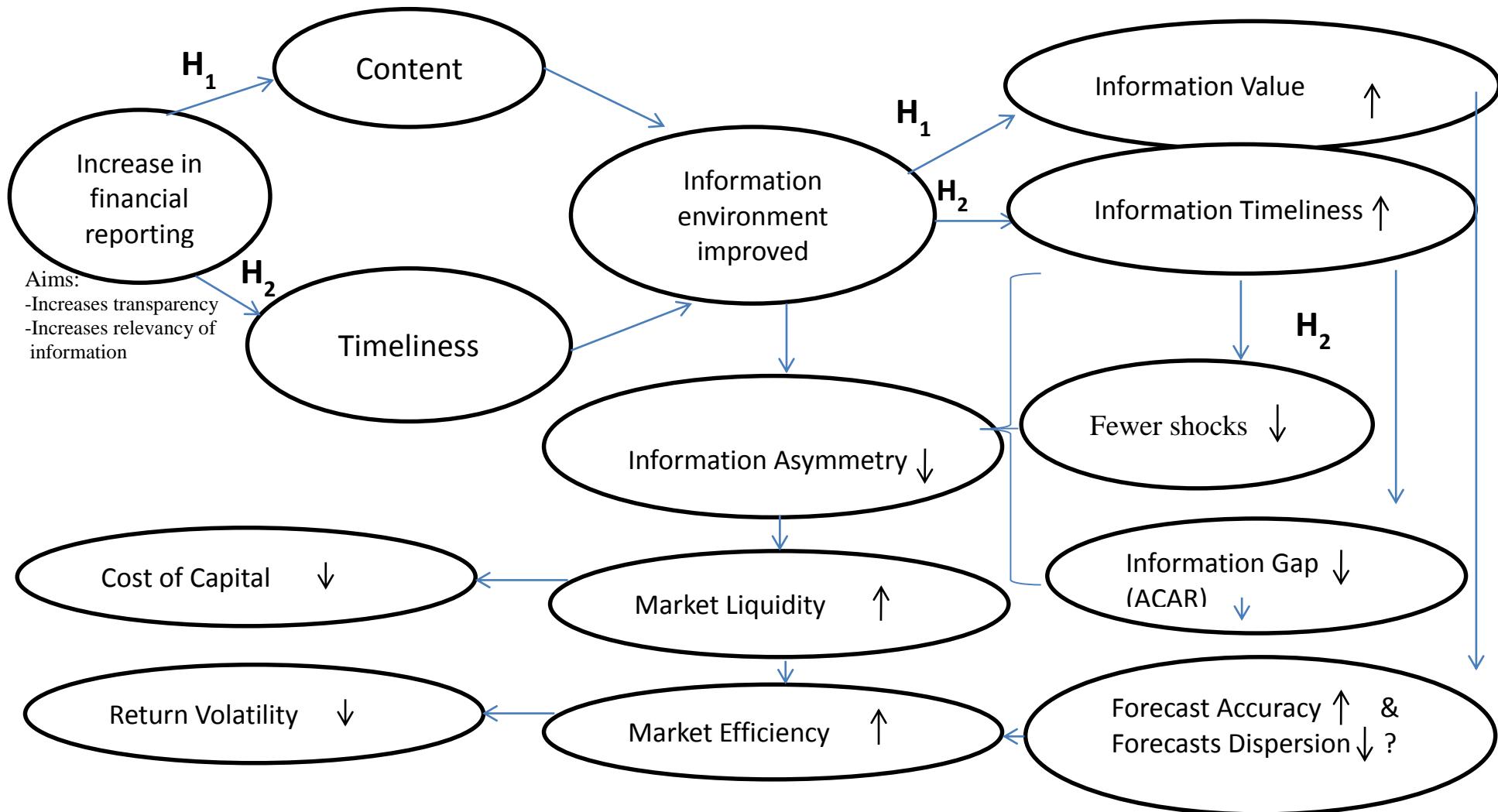


Table 5: The Summary of Mechanism and Measurement applied in this study

Legal Reform	Improved information environment	Market responses	Expected Outcome
Increased frequency in periodic financial reporting	Higher level of information content contributed to total information environment due to higher reporting frequency (H₁)	<ul style="list-style-type: none"> - Market reacts to new earnings announcement windows and results in lower surprise to mid- and year-end return around EADs (fiscal year) 	<ul style="list-style-type: none"> - Significant changes to information content and timeliness of Mandatory adopters - The association between annual return and return around EADs becomes stronger
	Faster speed of information dissemination and closer gap between informed and uninformed traders, which means increased timeliness (H₂)	<ul style="list-style-type: none"> - Lower expected abnormal return mid- and year-end return around EADs - Less heterogeneous forecast/ expectation from investors - Reduced information asymmetry reduces return volatility at the post legal reform period relative to pre-legal reform period 	<ul style="list-style-type: none"> - More reaction from investors to news (reduced risk-aversion) may change the equity prices (around quarter one and three) and market efficiency - Increased information timeliness /speed to reach investors (3months instead of 6 months) results in fewer shocks (around quarter two and four) - Reduced gap of equity prices before and after the earnings announcement results in lower abnormal returns at the post-legal reforms period - Lower return volatility, in term of lower magnitude of daily average changes in index return of equities after the legal reform to IRF

4.2 Capital Market Effects of Higher Disclosures and Market Efficiency

The type of information available in a market and its relevance can lead to different types of capital market efficiency (Fama, 1970). For instance, semi-strong efficiency assumes that investors have arbitrage opportunities to make excess returns if they receive private information. In this situation, the informed investors receive private information before the uninformed investors, which create information gap among traders. Thus, the uninformed investor's interest is less protected under semi-strong efficiency market. If higher reporting frequency may reduce the information asymmetry between informed and uninformed investors by releasing timely public information to all investors, the information may become relevant to most of the investors at the same time. This relevant information may change market behaviour and hence, influence the level of market efficiency.

In the following sub-sections, this study will discuss the impact of the legal reform to IRF on (1) equity prices, (2) risk-adverse investor behaviour, and (3) information asymmetry, which may eventually change the market efficiency.

4.2.1 Information Content and Equity Prices

This section explores the relation between changes in information content due to IRF and price changes in the market. This is an association-based research³⁰ (Verrecchia, 2001). It attempts to

³⁰ Verrecchia (2001) categorized the disclosure research into three broad categories: (1) Association-based disclosure; (2) Discretionary-based disclosure; and (3) Efficiency-based disclosure(Verrecchia, 2001). Where, the association-based category is to evaluate the relationship between disclosures and equity prices or disclosures and trading volume; discretionary-based category is to examine whether management / firms exercise discretion (to

identify how the diverse and competing investors change their characters and activities with additional disclosures. The value of information content may differ with the timing of disclosure. Therefore, when news is provided to investors on a timelier basis, the value of information content is higher and investors' responses to news may change equity prices.

Theoretically, when the reporting system requires the practice of quarterly rather than six-monthly reporting, the information content (news) in the periodic report becomes timelier, and thus relevant. For example, under a four-quarter reporting system, if a new piece of information happens to occur before/ on the reporting date of quarter one of a financial year, as required by law, it is to be announced to public within the following two months period. However, under bi-annual reporting system, it will take an extra of three months (almost 90 days) to report the same information around the mid-financial year. Conceptually, under a four quarter reporting regime, information that is related to quarter one should be higher in value if it is reported at quarter one than mid-year. Otherwise, the same piece of information may be released gradually to the public through other sources even before the mid-year reporting date. The information may reach investors through other sources such as voluntary disclosures by firms, private disclosures to analysts or searches carried out by investors, etc. (Chambers & Penman, 1984). Since a specific piece of information may be obtained from many other sources, the value of information content of the periodic report is diminishing over time when it is not announced to the public on a timely basis. Generally, when firms are mandated to switch from bi-annual to four quarter reporting regime, investors may react more often to the news announced at quarter one and three. There

release or withhold) if there is any additional information (other than mandatory disclosures, to their knowledge that can be useful in firm valuation). Finally, efficiency-based category is to investigate whether in consideration of costs of private information, “costless public announcement of information made investors better off despite adverse risk-sharing effect”. (Verrecchia, 2001).

may be more responses from investors at quarter one because they can compare the first quarter of preliminary performance of the business operation to budget or analyst forecasts made in the last financial year-end. However, reports around quarter three provide aggregate earnings and cumulative figures of financial information that allow investors/ financial analysts to forecast firms' year-end performance better. Hence, more frequent information dissemination via four reports instead of two reports in a financial year may improve the relevance of the information disclosed and overall improves investors' forecast accuracy.

Higher reporting frequency may increase the level of corporate transparency and create a richer information environment. Meanwhile, it causes 'fewer surprises' because when timelier information content is available to investors, investors' responses to news result in more rapid changes in equity prices. When equity prices adjust rapidly and reflect the most of the information available in financial market, the process of price adjustment helps firm's price to arrive at its true value. Thus, increased IRF may improve corporate transparency and also enhance market efficiency.

Therefore, when equity prices recover fast enough to reflect the firm's true value with improved market efficiency, the current market prices surrounding the quarterly reporting period become more related to the prices at the end of the year. In this circumstance, news reported in a quarterly announcement has contributed a proportion of information that is reflected in the equities prices over a year (Ball, Robin, & Sadka, 2008). The firms' buy-and-hold returns surrounding the quarterly earnings announcement dates (thereafter EAD) will be more associated with the annual buy-and-hold returns. (Ball & Shivakumar, 2008). The empirical evidence shows

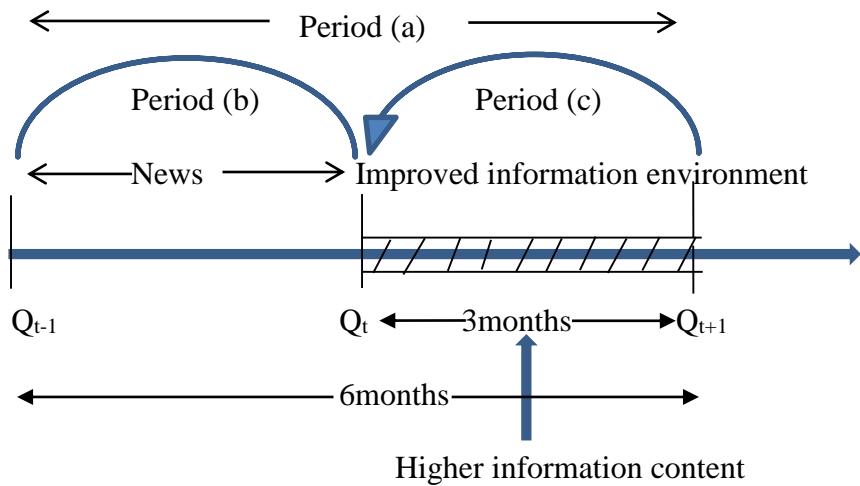
that when an increase of information content appears, the importance of earnings as a timely resource of information increases with the association between the annual buy-and-hold returns and buy-and-hold returns surrounding EADs (Ball & Shivakumar, 2008). This finding suggests that four quarterly returns surrounding EADs are able to explain the annual returns better than the two biannual announcements. Hence, the first hypothesis in this study is set as below:

H₁ : The higher reporting frequency results in higher information content.

The Mechanism

Figure 2: Expected Changes in Higher Frequency of Financial Reporting

A proportion of information content being shifted from Q_{t+1} to Q_t .



In Figure 2, before the legal reform to IRF, periodic report was released bi-annually at Q_{t-1} and Q_{t+1} . News occurred within period (a) would be announced to public at Q_{t+1} . After the legal reform to IRF, news occurred within period (b) will be reported at Q_t .

Figure 2 shows that a proportion of information that relates to period (b) and used to be reported at Q_{t+1} has been released earlier at Q_t under new four quarter reporting regime. Investors value

the same piece of information at a higher value at Q_t than Q_{t+1} because in order to make a good investment decision, it is always better to have news as soon as it occurs rather than later. New information will arrive at Q_t , and be incorporated into stock prices before Q_{t+1} .

Further, a possibility remains that new information released at Q_t spills over³¹ (Ball & Shivakumar, 2008) to period (c), before announcement at Q_{t+1} , due to a momentum effect. Certain investors may follow the trend of market reaction to the news and may cause the post earnings announcement drift³² after Q_t . The continuous changes in equity prices due to improved information environment may strengthen the market efficiency over period (c), i.e. between Q_t and Q_{t+1} . This could be a normal circumstance for a less efficient market.

4.2.2 Information Timeliness and Investor Behaviour

In this study, increased information timeliness may indicate an increase in speed of information arriving to investors via more frequent public announcement. Two benefits from timelier reporting can be noted: (1) News is released sooner (three months earlier) than before the legal reform to IRF, which influence on the risk-adverse behaviour of investors; (2) Firms are required to announce financial information publicly to ensure information is made available to all interested parties after the announcement. It is assumed that the information reaches all the

³¹Spill overs in this sense mean that even though there is a public announcement made, there is a possibility that some investors react slowly or later to the news (i.e. longer than one or two days after the event date). These are mostly risk-adverse investors who may adopt a “wait and see” attitude and have more research work done with regards to the news.

³² Price earnings announcement drift (PEAD) refers to the movement of equity prices following the direction of earning surprises, either the price movement is positive or negative (continue to drift upward or downward), for some time after the earning announcement (Ball & Brown, 1968). This could happen for some reasons, and the reason that is most applicable to emerging economies is the investor’s under-reaction to value relevant information from earnings announcements due to the delay of information dissemination (Truong, 2010) in a less efficient market.

investors, bankers and any other stakeholders at the same time. In this circumstance, the information gap between informed and uninformed investors will be reduced, and thus reduces information asymmetry. This second reason for a reduced information gap is discussed in section 4.2.3.

Earlier Arrival of News

Mandated quarterly reporting is expected to increase the speed of relevant information reaching investors. It allows information to reach all investors three months earlier than the practice of biannual reporting system, which increases information timeliness. If information content in the periodic report is timely, the information disclosed should be more relevant to investment decisions. The intensive response to news may promote market liquidity and affect market efficiency. This can be explained by the speed of information being reflected in equity prices through the market response to news over a given period (Butler et al., 2007).

Two main concepts of timeliness have emerged (Butler et al., 2007): (1) Intra-period timeliness (IPT), it measured the speed at which information is incorporated into equity prices (which is similar to (Ball & Brown, 1968) and (Alford et al., 1993)), and (2) long-horizon timeliness (Basu, 1997; Bushman et al., 2004). Long-horizon timeliness estimates the explanatory power of a returns-earnings regression or the magnitude of slope coefficient in such a regression. (Butler et al., 2007). However, the measurement used in this study is different from the Butler et al.'s. Instead of measuring the short term and long term timeliness, this study assesses the changes in timeliness of information content that influences the market behaviour. In summary, this study investigates the change of investor behaviour due to improved information environment.

Adverse Selection and Information Timeliness

Theoretically, increased disclosures should be more beneficial to a less complete market (i.e. semi-strong or weak form market efficiency) than a mostly complete market (i.e. strong form), (Verrecchia, 2001). In a less complete market, investors are generally risk-averse. According to adverse selection theory, risk-adverse investors trade against the market demand, which can distort investors trading decisions and cause inefficient assets allocation (Leuz & Wysocki, 2006). For instance, when another investor would like to buy share from a risk-averse investor, the latter may be reluctant to sell the share. The risk-averse investor may doubt of there is knowledge of specific information (i.e. good news) that is not known by him/her, or there is uncertainty of a specific event. These doubts influence the risk-averse investors and thus, reduce the probability of trading. Normally, this kind of risk adverse actions indirectly imposes out-of-pocket (loss) trading costs to the other investor (buyer), which results in a higher bid-ask spreads and investors may require a higher rate of return due to the higher trading costs (Leuz & Wysocki, 2006).

Reliable information disclosed in quarterly reporting can be used to alleviate this adverse selection problem of risk-adverse investors. Since mandated quarterly reporting is a more reliable source of information (Ku Ismail, 2012), the management is assumed to be more truthful in providing information (i.e. due to litigation risk, etc.). When more information is available to public investors via issuing more frequent periodic reports, the less informed investors will become price protected because there is more confirmative information provided. Besides, private information becomes costly to informed investors (Leuz & Wysocki, 2006) since there is

costless public information available. The risk that other investors may hold private information which is not known by risk-averse investors becomes lower, and hence, induces risk-adverse investors to trade. Aside from the confirmative nature of periodic reporting, one of the prime roles of quarterly reporting is to provide cumulative disclosures and aggregate amounts which update the users of information on the financial status of a firm and altered plans in the business operation and production. The information provided in the periodic report may lead to more accurate forecasts than other *ad hoc* continuous announcements or private information, and thereby result in more efficient allocation of scarce resources across time and firms to investors (Verrecchia, 2001).

Therefore, timeliness of relevant content is one of the keys to increase level of transparency and to mitigate the problems of adverse-selection. When risk-averse investors are less-adversely acting against the market movement, it stimulates liquidity, lowers the cost of capital, and thus increases market efficiency. The study hypothesizes that higher reporting frequency may improve timeliness, where information timeliness is examined by the changes of investor responses to earnings announcement. For example, if significant changes are seen in the relationship between annual buy-and-hold returns and buy-and-hold returns surrounding the earnings announcement dates after the legal reform to IRF, there are significant changes in investor responses to news due to the information timeliness.

H₂ : After the legal reform to higher reporting frequency, the information timeliness has been improved.

Alternatively, timeliness can be assessed by measuring abnormal return surrounding mid-year (quarter two) and year-end (quarter four) earnings announcement date after legal reform to IRF. When information reaches almost all investors and stakeholders at the same time, it reduces the information gap between informed and uninformed investors. Therefore, the shocks will be reduced as investors are more informed than before legal reform to IRF, which in turn lowers the abnormal return around earnings announcement dates. The information gap is further discussed in the following section of 4.2.3.

4.2.3 Information Gap and Information Asymmetry

Along with the news becoming more relevant to investors, increased corporate transparency via higher reporting frequency may reduce information asymmetry. When information is delivered to investors at a faster speed, this will improve the timing of news reaching different groups of investors, such as informed and uninformed investors. In addition, improved information timeliness may curb insider trading. In the real world, there are informed investors who always gather information in advance of uninformed investors or even before the news announcement, i.e. through private information acquisition and information leakage, etc. For example, an investor who has a relative working in an investment bank that runs a project on merger and acquisition on behalf of an acquirer firm may obtain news beforehand. By expecting the price to drop after the announcement on firm acquisition, this investor may sell the shares held in the acquirer firm before the announcement of this event. (Berkman, 2014). In this case, indeed, the informed investors trade at the costs of uninformed investors. In fact, increased reporting frequency may help to distribute the corporate financial information in a timelier manner to

public investors. Since more frequent financial reporting increases information timeliness, it may reduce the information gap between the informed and uninformed investors, and thus lower the information asymmetry.

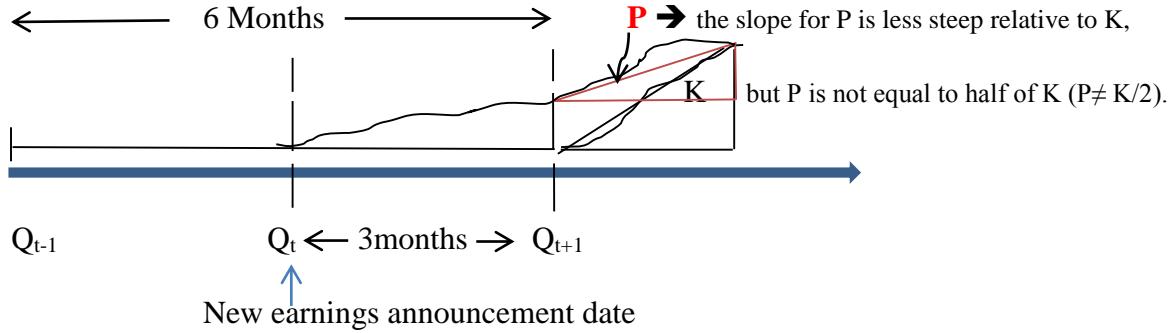
When the information gap is narrower than the gap before the legal reform, the investors should share closer opinions on a specific firm value and become less heterogeneous. This tendency reduces the spread between bid price and ask price, and result in lower abnormal return surrounding the earnings announcement dates (Heflin et al., 2003). The information gap is measured by comparing the difference of share prices on any day in the pre- announcement period and the post-announcement period for an upcoming earnings announcement (Heflin et al., 2003), i.e. this study selects (-45, +2) and (-60, +2) for the assessment of changes in information gap, measuring the abnormal returns from 45 days or 60 days before the EAD to the second day of the EAD. This measure of information gaps, proxies by absolute cumulative abnormal returns (thereafter named ACAR) surrounding earnings announcement dates, are compared for the period before and after the legal reform (Heflin et al., 2003). In contrast, it is arguable that more disclosures can result in differences in opinion among investors. The former may result in a lower bid-ask-spread among sellers and buyers, and the latter may result in a higher bid-ask-spread due to higher forecasts dispersion. Regardless of these consequences, the aim of legal changes is to lead the market towards a better level of transparency. When investors become more informed with increased transparency and improved information environment, they can make a better valuation of the firm and act more confidently in their investment decisions.

After the legal reform to IRF, the reduced information gap may result in higher trading activities and affect the market efficiency. Improved market efficiency and reduced information asymmetry may result in lower return volatility because when the market becomes more efficient with news more rapidly reflected in equity prices, the equity prices become more stable and thus, less volatile. Return volatility is further discussed in Section 4.2.4.

The Mechanism- Information Timeliness

Figure 3 shows that under four-quarterly reporting regime, higher reporting frequency may increase information timeliness with more news arrived to investors earlier at quarter Q_t , and consequently reduces the content at quarter Q_{t-1} and Q_{t+1} (normally at quarters two and four over a year). When information becomes timelier, investors may react earlier to the news and result in a lower deviation of prices and abnormal returns at quarter Q_{t-1} and Q_{t+1} (i.e. quarters two and four). Heflin et al. (2003) show evidence that a lower abnormal return after the legal reform to Fair Disclosure may imply a superior pre- announcement information (Heflin et al., 2003), which indicates an improvement of information environment before the earnings announcement date. The lower content at quarter Q_{t-1} and Q_{t+1} in this case is due to news that is related to the earlier quarter has been released earlier, which in turn slightly reduces the content of reports around quarter Q_{t-1} and Q_{t+1} . Thus, the increased of reporting frequency may result in fewer shocks and lower abnormal returns surrounding these reporting dates in quarters two and four of four-quarters reporting regime relative to a bi-annual reporting regime.

Figure 3: Information Timeliness



For example, in Figure 3, before legal reform to IRF, periodic report was released bi-annually at mid-year and year-end (Q_{t-1} and Q_{t+1} respectively). News that occurs between Q_{t-1} and Q_{t+1} (6 months period) will be released at Q_{t+1} to public investors. This may result in market responses that require a price adjustment with abnormal returns of slope K . After legal reform to IRF, a public listed firm is required to make three monthly (quarterly) reports. Therefore, news that occurs on / before the date of the reporting at Q_t (quarter three) will be released at Q_t instead of Q_{t+1} , which means this piece of news is delivered in a faster speed or on timelier basis. Investors may start to respond to news after announcement at Q_t , which may reduce the shocks around Q_{t+1} and thus, result in smaller price adjustment with abnormal returns of slope P (in Figure 3). Better price adjustment after the earnings announcement event window at Q_t and before Q_{t+1} signals an improvement in the information environment and market efficiency. Overall, the reduction in abnormal returns at quarters two and four may indicate that four-quarterly reporting regime leads to a better disclosure environment which reduces information asymmetry, and hence improves market efficiency.

4.2.4 Effect on Returns Volatility

Since higher reporting frequency may improve information asymmetry and market efficiency, the equity return should be less volatile at the post-legal reform period. When information asymmetry is reduced, the return volatility should be lower because the equity prices are more efficiently adjusted in the financial market to reflect on information available. Investors may become less different in opinion on a firm's true value. Thus, equity return becomes more predictable and less volatile. This may enhance the importance of earnings announcement as a source of new information because of the contribution of more frequent earnings announcement windows towards returns volatility (Ball & Shivakumar, 2008). Particularly, those investors in high volatility firms or investors that trade during the financial crisis, are normally more sensitive to news because a piece of new information may possibly result in a large movement of equity prices in the capital market. Thus, timely and reliable sources of information are crucial to the investors of high volatility firms.

Nevertheless, evidence shows increases in news announcements increases idiosyncratic volatility³³ (Campbell, Lettau, Malkiel, & Xu, 2001). Campbell et al. (2001) suggest that earnings announcement event-related return can be measured by the volatility of individual equity returns relative to the market. Hence, this study proxies the volatility of individual equity returns relative to the market by measuring the average changes of index return over the years 1996-2004. A further discussion on methodology is presented under Section 5.8 and the graph of changes in return volatility over time is plotted under Section 6.4.

³³ Idiosyncratic volatility refers to unsystematic risk that can be diversified away through holding a portfolio of equities.

4.3 Mandatory Effect of Disclosure Regulation

4.3.1 Theory of Disclosure Regulation

According to the theory of disclosure regulation (Leuz & Wysocki, 2006), firms understand the trade-offs of corporate disclosure. The benefits always out-weigh the costs when a firm voluntarily provides information to outside investors. For example, firms with higher-than-average value have an incentive to disclosure private information about their true value to outsiders in order to differentiate themselves from the average-value firms. If a firm (normally a family-owned firm) is more conservative and withholds corporate information (e.g. due to the negative performance), the investors may require a higher return on capital invested. (Leuz & Wysocki, 2006).

4.3.2 The Role of Mandatory Disclosures

The role of mandatory disclosure is hence not specifically just to curb the agency issues, the economic rationale of having the regulation revamped towards enhancing the level corporate transparency is more pronounced (Leuz & Wysocki, 2006). Leuz and Wysocki (2006) review an extant literature and summarize some of the importance of disclosure regulation. First, the evidence shows that mandatory disclosure can be utilized as a commitment device to force firms to disclose good and bad news to the public (Verrecchia, 2001). In this sense, the management is obliged to reveal instead of postpone the loss performance and may have less time to manipulate the accounting report. Second, the public enforcement by law and criminal penalties empower the requirement of higher periodic reporting frequency to prevent management from avoiding their reporting commitment to investors (Leuz & Wysocki, 2006). Third, it is at the cost of

controlling shareholders when the management is reluctant to disclose information, which could happen when the management has intention of expropriating for self-benefits and thus foregoes the profitable investment opportunities (Doidge, Karolyi, & Stulz, 2004). The effect of foregoing of the profitable opportunities can be at the waste of the economy (Ferrell, 2008), because the management can maximize the shareholders benefit instead of self-benefits by investing in more positive net present value (NPV) projects (Gigler et al., 2014)

Next, mandatory disclosure may result in both positive and negative externalities. For example, when the information disclosed on a firm is used by the potential investor for some comparison purposes to other firms, this may result in information transfer and trigger their interest of investment in other firms (Admati & Pfleiderer, 2000). The negative impact of externalities is an increase of disclosures that drives away the investors from other firms thereby lowering the price efficiency of other firms (Fishman & Hagerty, 1989). Last, the harmonization of global regulation changes around the world leads the regulators to consider the effect of global changes in regulations on the net outcomes of domestic regulation changes (Leuz & Wysocki, 2006).

Overall, the study on the enforcement of the legal reforms to increased frequency of periodic reporting aims to (1) explore the effect of these legal reforms to IRF on the level of transparency and market efficiency in an emerging economy; (2) make the policy makers aware of the effects on the economy when the required disclosure is mandate than voluntarily. It can be important to identify whether the effect of externalities from the increased frequency of disclosure, i.e. mandated quarterly reporting in this case, may attract (or retain) investors from other economies.

4.3.3 Voluntary versus Mandatory Disclosures

A broad range of research work has been done on the usefulness of voluntary disclosures. Gigler and Hemmer (2001) investigate the indirect effect of mandatory periodic reporting in disciplining manager's voluntary disclosure. They document that firms that are less conservative would disclose more information voluntarily to the public than those firms that are more conservative. They file evidence of bias in a mandated periodic reporting requirement as it forces firms that are more conservative to make pre-emptive disclosure as per firms that are less conservative, which has gone against the accounting theory of conservatism (Gigler & Hemmer, 2001).

In this study, increased frequency in periodic reporting means increased financial disclosure to the public/ outside investors mandatorily. Such an increase could reduce the added value of disclosures gained by firms who report voluntary before the legal reform to IRF. Gigler and Hemmer (1998) argue that voluntary disclosures can be more precious than mandatory disclosures. In consideration of related costs (e.g. direct costs of producing report and litigation costs), the mandatory requirement of periodic disclosures induces managers to reduce the voluntary disclosures because it involves higher costs to produce both. Thus, this reduced incentive to managers may lower the price-informativeness of earnings from voluntary disclosures. (Gigler & Hemmer, 1998). The studies on voluntary disclosures normally involve investigation on a specific group of firms that seek price-effectiveness via voluntary disclosures to the public. Given the fact that the outcomes of the studies on voluntary disclosures cannot be generalized to all firms, the findings from these studies cannot explain the economic efficiency

that can be explained by the outcome from the requirement to mandatory disclosures. (Gigler & Hemmer, 1998).

Further, mandatory change to reporting frequency may influence management behaviour. Generally, there is always a question of how truthful management can be given the existence of agency problems. According to agency theory, the management may use the on-hand details of projects towards their own investment benefits (Jensen & Meckling, 1976), or inform their related parties or financial analysts with established relationships with the firm. Evidence of higher insider trading activities appears under weaker corporate governance environments (Rafael La Porta et al., 2002). Mandatory disclosure via higher reporting frequency has been dealing with this aspect of the agency issues in order to strengthen the level of corporate transparency. Increased transparency restrains earnings manipulation and insider-trading. Generally, this strengthens the investors' confidence towards firms and financial market of an economy. The increase level of transparency via quarterly reporting may stimulate more trading, and hence results in a possibility of higher return (La Porta, Silances, Shleifer and Vishny, 2002; Gompers et al, 2003).

4.4 Summary

Higher reporting frequency is expected to improve the information environment. Quarterly reports are expected to release more information content than bi-annual reports. With increased content, equity prices adjust more rapidly to the timely news in order to reflect a firm's true value. Under this circumstance, four quarters buy-and-hold returns surrounding the earnings announcement dates (thereafter named EADs) will be more related to the annual buy-and-hold

returns than two bi-annual window returns. This phenomenon can be explained as four quarterly reports have resulted in increased value relevance of information, where the timelier news has contributed as additional content to the total information environment. Thus, the legal reform to IRF permits the window returns (surrounding EADs) to explain the annual returns better (Ball & Shivakumar, 2008) in a statistical base. The first hypothesis is set on how much new information becoming publicly available via quarterly reporting has increased the firm's transparency and affected the equity price changes. Overall, the association between annual buy-and-hold returns and window buy-and-hold returns surrounding earnings announcement date increases.

To improve corporate transparency, timelier and higher quality information disclosures may reduce the market information asymmetry (Heflin, Shaw and Wild, 2002; Jain and Rezaee, 2006; Chiyachantana, Jiang, Taechapiroontong and Word, 2004). Normally, a better governed firm makes more timely disclosure that speed up the price discovery because corporate governance "quality" influences the informativeness and the information flows of disclosures at the firm-level. (Beekes & Brown, 2006). There are two main benefits of timelier disclosures. First, it enhances the speed of the information arriving to all investors, thereby increasing information timeliness (Butler et al., 2007). Second, it reduces the gaps of information reaching investors at different times (Bailey, Li, Mao, & Zhong, 2003; Heflin et al., 2003) and hence leads to lower abnormal returns. Lower information asymmetry may lower the bid-ask spread (Leuz & Verrecchia, 2000; Mei, Dhaliwal, & Neamtiu, 2011). Hence, the second hypothesis is to examine whether four-quarterly reports provide more timely information than two bi-annual reports.

Investors' confident in assets' pricing may stimulate market liquidity. When higher reporting frequency improves information asymmetry and market efficiency, the risk-averse investors may be induced to trade more often. This is because the investors become more confident in the market with higher level of corporate transparency and strengthened shareholder rights protection. The increased market liquidity lowers the cost of capital. In summary, higher reporting frequency may enhance value relevance of information, result in fewer shocks and lower information asymmetry between informed and uninformed investors. These effects are reflected in changes of investor behaviour and equity prices that consequently change the market's efficiency. Overall, the increased level of transparency with higher reporting frequency should improve market efficiency.

In summary, the purpose of this study is to identify the effect of legal reform to IRF on investor behaviour and market efficiency. There are two main hypotheses tested in this study.

- (1) **The higher reporting frequency results in higher information content and timeliness.** Four quarter reports allow returns surrounding earnings announcement dates to explain a higher proportion of the annual returns than two bi-annual reports.

- (2) **After the legal reform to higher reporting frequency, the information timeliness has been improved.** Timely information refers to relevant information, which four quarterly reports may increase the speed of information reaching investors than two bi-annual reports, especially uninformed investors. Higher timeliness due to increased reporting frequency should reduce information asymmetry, thereby reduce the

information gap between informed and uninformed investors and further reduces return volatility.

CHAPTER 5 RESEARCH DESIGN

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5.6.4 Information Gap and Timeliness

5.6.5 Return Volatility

5.7 Summary

5.0 RESEARCH DESIGN

5.1 Models

Main Analysis: DID Analysis with PSM

This study employs a Difference-in-differences model (Heckman et al., 1997; Heckman, Ichimura, & Todd, 1998) with propensity scores matching analysis to assess the treatment effect of higher reporting frequency on public listed firms, i.e. to examine the net treatment effect of regulation on mandated firms that switch from a bi-annual to a four-quarterly reporting regime. In this case, the change to information content and timeliness (thereafter named CICT) is measured as the outcome variable that is used to examine the effectiveness of this legal reform; it is used as a proxy of changes in the level of transparency and market efficiency. This Heckman's DID model is an expansion of the Rosenbaum and Rubin (1983) framework for a propensity score matching analysis.

This study integrates the event study model and propensity scores matching model in the DID analysis. Even though an event study model is used to investigate the impact of changes to mandatory disclosure environment on firm value (MacKinlay, 1997), it has to fulfill the reasonable evidentiary standard (Thornton, 2013; Gagnon, 2011) that the effects measured (on investor's behaviour) are due to increased frequency of financial reporting. This study does not test the Hypothesis of Market Efficiency (EMH)³⁴ but rather measures the changes of key determinants of market efficiency, the value relevance of information in term of information content and timeliness.

³⁴ The Efficient Markets Hypothesis (EMH) assumes that capital markets react in an efficient and unbiased manner, where all publicly available information will be quickly dispersed among all interested users and adjusted to the equity price (Deegan, 2014, page 220).

Mandatory Adopters versus Early Adopters

When estimating the treatment effect, the test is designed to shed light on the impact of legal reform of IRF on the sub-group of the mandatory adopters (MA). This is because even though this legal enforcement to IRF is aimed to regulate all public listed firms, the effect is expected on the mandatory group only. The impact on the early adopters (EA) is expected to be zero apart from spillover effect from greater liquidity in the market as a whole. In short, the mandatory adopters (MA) are forced to switch from bi-annual to four-quarterly reporting regime after the legal event, and early adopters (EA), form the benchmark group. Early adopters are firms that already release quarterly information before quarterly report becomes mandatory. This includes firms that are cross-listed via American depository receipts (ADRs) in the United States and those that choose to release the information voluntarily, ‘voluntary adopters’. American depository receipts (ADRs) are mainly for the non-U.S. firms that trade in the U.S. financial market. ADRs allow firms to raise funds through public offerings to investors and investors to trade on these shares on the secondary market in the U.S. The EA thus forms a benchmark group against which the effect of the introduction of mandatory earlier disclosure on the MA group can be assessed. In this case, there is no direct effect of legal reform to IRF expected on the benchmark group (EA). Thus, in the ‘treatment’ terminology, EA is the untreated group and MA is the treated one.

The mechanism of the DID model

Figure 9: Heckman's Difference-in-differences Model (Heckman et al., 1997, 1998)

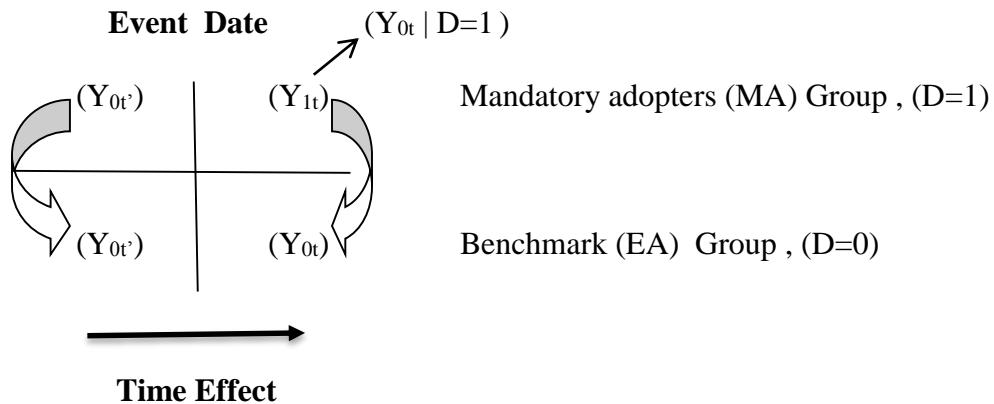


Figure 9 above shows that the method of DID accounts for: (1) the differences between treated and untreated (affected versus non-affected) firms affected by the new legal reform, matching the groups of firms by conditioning on firm characteristics; and (2) the differences between before and after the legal reform to higher reporting frequency (thereafter named IRF). The DID model accounts for variations over time while matching the two groups, MA and the benchmark group, and this model should off-set any other effects derived from other regulations or other factors take place during the test period. Since the EA group practices quarterly reporting even before the introduction of new legal reforms, the difference-in-differences tested between the two groups may appear to be negative. The gap between the two groups becomes smaller because the level of transparency for these two groups is now closer. The significant negative different in findings may indicate that the legal reform to IRF can effectively improve the information environment of the treated firms (MA) by enhancing the level of transparency. Additionally, the investor rights protection on financial disclosures has also been strengthened.

In order to find the treatment effect of legal reform to IRF, this DID model matches the CICT of MA to EA's using propensity scores. In this study, propensity scores matching model is employed to, (1) measure the propensity scores for each firms; and (2) perform matching analysis between mandatory adopters (MA) and early adopters (EA). Propensity scores matching model first measures the propensity scores for each firms and performs matching analysis between mandatory adopters (MA) and early adopters (EA). This study follows the work of Butler et al. (2007) to account for agency costs only, and I add on the size effect. After defining the differences between the two groups due to the legal change ($Y_{1t} - Y_{0t} | D=1$), it can be off-set against the differences measured at the pre-legal reform period by getting rid of the time effect.

$$E(Y_{1t} - Y_{0t} | D=1)$$

$$\Rightarrow \text{Heckman's model: } \Delta_{\text{DID}}(X) = E(Y_1 - Y_0 | D=1, P(X)) \quad \text{equation (3)}$$

where, Y , the outcome variable is the changes of information content and timeliness of firm i. $D=1$ represents the mandatory (treated) group, $D=0$ is for the benchmark (untreated) group. $P(X)$ is the conditional firm characteristics that are used to match the benchmark group to mandatory group (MA).

In fact, this study refers to Heckman et al.'s (1997) paper which applies the DID model using a kernel-based matching method on propensity scores in the evaluation of the labor market programs (Heckman et al., 1997; Heckman et al., 1999). The kernel-based matching is also

named smoothed weighted matching, where mandated firms with the greatest weight are matched to the control firms with closer propensity score (Heckman et al., 1997, 1998).

In summary, if the net treatment effect measured for this legal reform to IRF is significant, these findings may indicate the effectiveness of higher reporting frequency in an emerging economy. The detailed discussions on the DID model and its application of the two-stage procedures of Heckman's DID are discussed in Appendices 12 and 13³⁵ respectively.

Other Tests and Models

Two alternative DID approaches are utilized to support the outcome of the key findings in this study: (1) alternative matching methods based on Abadie and Imbens' Matching estimator (Abadie & Imbens, 2002, 2006) under section 5.5.1, and (2) an alternative DID approach with firm-year pooled cross-sectional regression (Wooldridge, 2002) under section 5.5.2. Further, under section 5.6, other robustness tests on the treatment effect of legal reform to IRF on MA are compiled and carried out in three forms: (1) Firm-year cross-sectional regressions on MA; (2) MA-December FYE firms, and (3) Crisis effect. Section 5.6.4 explores the effect of improved timeliness on information gap. Finally, Section 5.6.5 demonstrates the impact of legal reform to IRF on return volatility.

³⁵ The detailed discussions on the DID model and its application have been re-arranged to the appendix (Appendix 12 and 13) because this DID with PSM model is complicated and is better explained in its own specific section so it does not disturb the flow of the test.

In summary, there are two main areas of theoretical expectations from the findings of the analysis. Please refer to Table 12 below for a summary of research methodologies applied in this study.

Table 12: Summary of Research Methodologies

(I) Main Analysis: DID Analysis

Aims: test the effect of regulation reform on information content and timeliness, by controlling for selection bias and endogeneity.

Methodology	Economic Event	Sub-group	Pre-legal reform	Post-legal reform	Expected results
Treatment Effect analysis: Difference-in-differences Model (Heckman, et al, 1997, 1998)	Regulation reform	(1) Switching Group (MA)	The switching group is less (<) efficient in updating information to equity prices as compared to the benchmark group	The switching group becomes more (>) efficient in updating information to equity prices at post- legal reform period relative to pre-legal reform period. After the legal reform period, the gap of changes in information content and timeliness of MA becomes closer to the early adopters (EA) than before the legal reform period.	There is a significant effect of legal reform to IRF on mandatory adopters (MA) at the post-legal reform period. The treatment effect analysis provides significant results of the treatment effect on treated group (ATT).
		(2) Benchmark Group (EA)	The benchmark group is more (>) efficient in reflecting information into security prices than the switching group.	There is no significant effect / change to the information environment of benchmark group (EA) at the post-legal reform period.	No significant effect on EA. The effect on MA may not be significant if there are significant changes to the information environment of the benchmark group (EA).

(II) Robustness Check: Firm-year Cross-sectional regression

Aim: firm-year comparisons of effects to information environment and control for heteroscedasticity.

Methodology	Economic Event	Reporting Regime	Pre-legal reform	Post-legal reform	Expected results
Panel Data analysis : Firm-year Pooled Cross-sectional regression	Earnings announcement event	(1)Bi-annual reporting regimes (two existing plus two artificial windows)	The mid-year and year-end window returns (the existing two windows) are significant.		
		(2)Quarterly reporting regimes (two existing plus two-new windows)		<p>The existing window returns become less (<) significant at Quarter 2 and Quarter 4 than before the legal reform to IRF due to lower shocks after more frequent reporting.</p> <p>The new windows at quarter 1 and 3 are more (>) significant than the two existing windows due to arrival of news.</p>	<p>The significance of window returns have shifted, for instance, from Quarter 2 to Quarter 1, and from Quarter 4 to Quarter 3.</p>
Chow Test (F- statistics)		Difference between the regimes			Significant changes between two regimes

5.1.1 Treatment Effect Analyses and Mode Selection

This study uses Heckman's (1997, 1998) Difference-in-differences model with propensity score matching, an econometric model for treatment effect analysis, mainly because of its benefits in controlling for endogeneity, heteroscedasticity and eliminating the observable and unobservable bias, which are some of the concerns raised on Selection models (Lennox et al., 2013).

Figure 8: Selection Models versus DID models

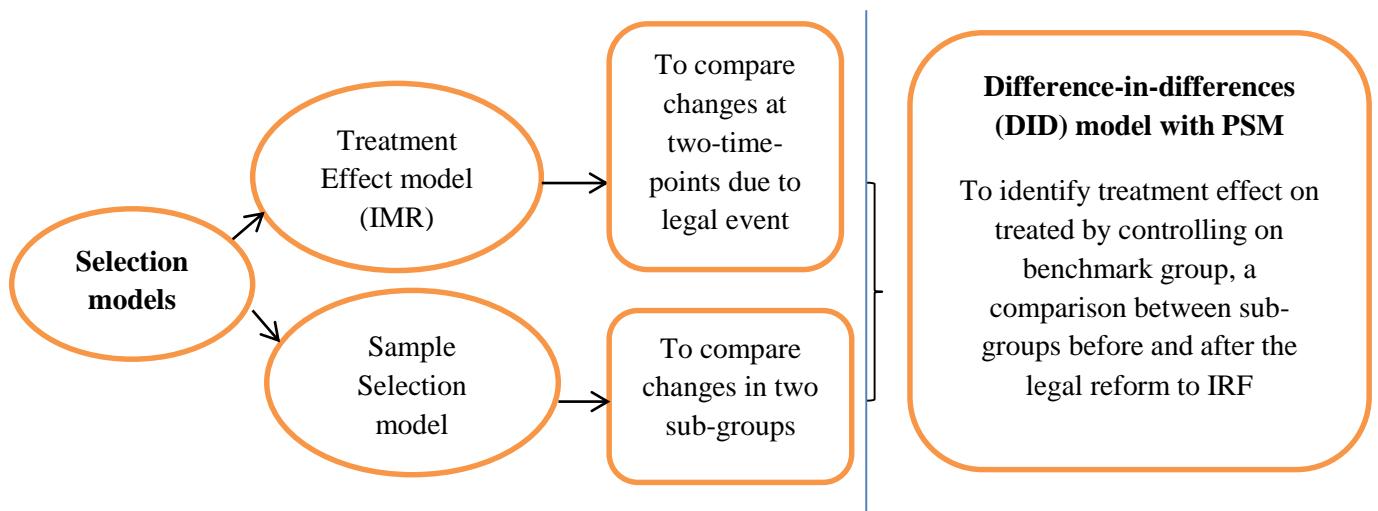


Figure 8 above shows that analysis work that used to be performed by Treatment effect model and Sample selection model of Selection models can now be performed by DID model with PSM. Unlike the Difference-in-differences model, the Treatment effect analysis of Selection models employs the Inverse Mills Ratio (thereafter named IMR)³⁶ to examine the changes to information environment over two-time-points. On the other hand, a separate Sample selection

³⁶ IMR, refer to Appendix 3. The equations and distinct between methods of selection are stated in the diagram in Appendix 2.

model permits a comparison of variable outcomes between two sub-groups. On the right side of the Figure 8 on previous page, the DID model is able to capture both the time-variant effect and the differences between two sub-groups that would be performed by two analyses of the Selection models. It combines the two sub-groups with propensity score matching and at the same time it accounts for the effect of time variation to examine the treatment effect on treated (mandatory adopters, MA). This is performed by controlling the benchmark group (early adopters, EA). In fact, it allows evaluation of the effect of legal reform to IRF on mandatory adopters from more than one dimension at one time (Todd, 1999).

Model Selection

Heckman's DID methodology with propensity scores matching is used in this study for several reasons. First, because DID-PSM analysis (Heckman et al., 1997) is more effective in eliminating bias as compared to the Heckman's Correction model (Lennox Francis & Wang, 2012). The DID method employs two-stage procedure³⁷ to correct for unobservable selection bias in estimates (Heckman et al., 1997, 1998), observable selection bias (Heckman, 1976, 1979), and also to address the concern of endogeneity (Lee & Wahal, 2004). Selection bias occurs when two different groups of firms are compared as if they are similar, but where in practice they have different (heterogeneous) firm characteristics (Ammer et al., 2012). Even though the Heckman's Correction model using IMR³⁸ (Heckman, 1979) can also be used to control for selection bias in unobserved samples, it does not totally eliminate the bias (Lennox et al., 2012). In this study, the non-randomly selected sample to mandatory adoption of higher reporting frequency could result in ordinary specification error or “omitted variables” bias

³⁷ The two-stage procedure will be discussed in the section of Application of DID.

³⁸ The equations and distinct between methods of selection are stated in the diagram in Appendix 2.

(Heckman, 1979). There may be also unobserved bias due to data truncation when using panel data analysis (Heckman, 1976, 1979). For instance, in the analysis of this study, firm is excluded if (1) there is one or more missing earnings announcement dates in both the pre- and post-legal reform period; (2) it has any missing or incomplete financial data during the test period.

This DID approach is a widely used methodology in economics, finance and accounting literature. For example, there are studies of the treatment effect of changes in minimum wages (Card & Krueger, 1994); the evaluation of labor market programs (Heckman, Ichimura, & Todd, 1997; Heckman, Lalonde, & Smith, 1999); in the trade and development (Becker and Egger, 2013); the treatment effect on the economics of education (Farré et al., 2013; Klein, 2013; Titus, 2007); the study on the consequence of financial reporting failure for outside directors (Srinivasan, 2005) and so on (Bushee, 2012 ; Leuz, 2003). In finance literature, Fu et. al. (2013) and Ammer et. al. (2012) use a DID model for the second analysis in their research studies. In the accounting literature, studies that employ DID model appear mostly in the most recent decade (Francis, Hasan, Park & Wu, 2014; Ahmed, Neel & Wang, 2013; Naranjo, Saavedra and Verdi, 2013). However, the usage of DID with PSM analysis is still not very common in accounting literature (Francis et al., 2014).

5.1.2 Compare to Alternative Methodology

Compare to method used by Butler, Kraft & Weiss (2007)

Different from the methodology used by Butler, Kraft & Weiss (2007), which show little evidence that firms mandated to report more frequently improve their earnings timeliness, this study seeks to examine the significant changes to total information environment of mandated

firms, in terms of information content and timeliness due to higher reporting frequency. This study does not follow Butler et al. (2007) since they measure the speed of financial information reflected in security prices by measuring the short term and long term earnings timeliness. In Butler et al.'s (2007) paper, the short term, intra-period timeliness (IPT) is measured by the average changes in monthly buy-and-hold returns; the long term timeliness investigates the association between accounting earnings and firm's equity returns. (Butler et al., 2007).

In this study, the differences of the contribution of timely content to the total information environment are examined by measuring the changes in the association between annual equity return and periodic equity return (Ball & Shivakumar, 2008). Annual returns are the sum of returns over the sub-periods of the year. This study considers how much these periodic returns contribute to the annual return, or whether the price changes after each periodic earnings announcement changes the periodic returns that is getting closer to the annual average buy-and-hold equity returns (Ball & Shivakumar, 2008).

Butler et al. (2007) apply Heckman's (1979) Correction model that is using an Inverse Mill's Ratio (IMR) to compute the 'probability of firms choosing a particular reporting frequency' (full sample with voluntary and mandatory firms), or 'the probability of a change in reporting frequency being non-discretionary' (switching sample with mandated firms). This model controls for endogeneity and reduces the observable selection bias (Heckman, 1979). Since propensity score matching (PSM) method of Heckman et al. (1997, 1998) is able to solve the issues of both observable and unobservable bias (Lennox et al., 2012), in this study, the DID Matching models are selected to evaluate the treatment effects of legal reform to IRF rather than the treatment effect model with IMR used in Butler et al.'s (2007) paper.

In fact, this study refers to Butler et al.'s (2007) factors used in determining reporting frequency choice, whether to voluntary adopt quarterly reporting. However, only one out of five factors that are used in Butler et al.'s (2007) study, agency costs, is accounted for in this study, and include another factor of size effect. This probably can be due to the differences of institutional factors among emerging and developed markets. These peculiarities of developing market, such as size effect and the level of transparency have been accounted for. Particularly for Asian economies including Malaysia, most of the listed firms have concentrated family ownership (Claessens, Djankov, & Lang, 2000; Wiwattanakantang, 2000). This type of family ownership concentrated firms is normally smaller in size among the public listed firms and has a lower level of transparency than those dispersed shareholding one.

Structure of Chapter 5

Section 5.2 discusses the Sample Selection. Section 5.2.1 covers the selection and collection of sample data from difference sources. Section 5.2.2 further explains on the concept of event study and test periods chosen for this event study. Section 5.2.3 presents descriptive statistics on the sample selected.

Before discussing the empirical analysis, Section 5.3 explains on the invented artificial window in the empirical tests. The aim is to allow like-with-like comparison of equity prices changes around earnings announcement dates before and after legal reform to IRF. These artificial windows are tested for randomness.

Next, Section 5.4 presents the measurements of variables which are applied in the main analysis and robustness tests. Section 5.5 discusses the models of alternative DID tests. Section 5.6 discusses the firm-year cross-sectional regressions as robustness tests of this study. Section 5.5.1 and 5.5.2 are the alternative tests of DID, the comparative matching methods and the cross-sectional regression. Section 5.6.1 demonstrates the design of robustness tests using firm-year cross-sectional regressions for mandatory adopters and Section 5.6.2 for December FYE firms only. The subsequent robustness test checks on the effect of legal reform to IRF at different time points, such as effects during crisis period versus non-crisis period are explained in Section 5.6.3; Section 5.6.4 presents a test of reducing information gap due to improved timeliness. Finally, Section 5.6.5 discusses the impact of legal reform to IRF on return volatility and Section 5.7 is a summary of Chapter 5.

5.2 Sample Selection

5.2.1 Sample Data, Sources and Size

(I) Sample Data and Sources

The sample data in this event study includes the dates and equity prices surrounding half yearly and quarterly earnings announcements made by the listed companies at Bursa Malaysia (formally known as Kuala Lumpur Stock Exchange, KLSE) for two fiscal years before and after the legal reform to higher reporting frequency (IRF) in 1999. 1999 is set as a transition year. Earnings announcement dates are extracted from SIRCA's Thomson Reuters Tick History (RDTH). Financial data for other variables are obtained from Datastream and Global Vantage. Table 6 below shows the number of firms listed at Bursa Malaysia for year 1997 to 2001, which gives an average number of 762 firms over 5 years.

Table 6: Number of Listed Companies at Bursa Malaysia

Year	Main Board	Second Board	Total
1997	444	264	708
1998	454	282	736
1999	474	283	757
2000	498	297	795
2001	520	292	812

Source: (Bursa Malaysia, 2009b)

Since the Malaysian Securities Exchange Commission (SEC) was only formed in 1993, more financial market data are available from 2000 onwards. Due to the fact that the empirical event

occurred in 1999 and Panel data is used in this study, many firm observations are discarded because of incomplete data available for some of the listed firms in the pre-legal reform period. I have checked the data for normality, independence in term of serial correlation coefficient, and control for heteroscedasticity in tests. I assume a constant industry effect for all the analyses performed in this study.

(II) Sample Size

Table 7 presents two sample sets of different size that are captured in the analyses of this study: Column 1 is the sample set for fiscal year analysis, and Column 2 is the sample set for calendar year analysis. All the analyses performed in this study are using sample set based on fiscal year analysis except for the test of Crisis effect. This is because the test of crisis effect is designed to capture the impact of crisis, by comparing the regression results of crisis period to non-crisis period, where the calendar year analysis allow the comparison of market responses to crisis on firms at the same period of time. If the test is set under fiscal year basis, for the same quarter, there is a possibility that certain firms are facing business cycle and some may not experience the same environment, this may cause an issue of consistency in comparison.

Table 7A Column 1 presents the sample size for firms selected for main analysis and all other alternative tests covered in this study that utilize the event window period set on fiscal year basis. A final sample of 85 firms is employed for the main treatment effect analysis, using the Difference-in-differences (DID) methodology.

Table 7: Sample Size

	Fiscal year No. of firm	Calendar year No. of firm
Full sample: Average for year 1997 and 1998	722	722
Firms with complete Earnings Announcement Dates (EADs)	215	215
Firms with data available to measure buy-and-hold (BH) return	116	158

Table 7A: Sample Size for Main DID analysis and Alternative Tests

Firms with data available for EAD, BHR and firm characteristics	85
- Mandatory Adopters (MA)	80
- Early Adopters (EA)*	5
Total Observations for <i>Main DID Analysis & Alternative Tests</i>	1,360
Total Observations for <i>DID with Cross-Sectional Regression</i>	340

Table 7B: Sample Size for Pooled Firm-year Cross-Sectional Regression

	Fiscal year No. of Firm	Calendar year No. of Firm
Total Firms with complete EADs for two-year window Prior- to and after the effective date of legal reform to IRF	No. of Obs.	No. of Obs.
FULL SAMPLE		
(1) Total firms available in each year	116	158
(2) Total observations for all firms over 4 years	464	632
(3) Total firms & observations for all firms over 8 years (include 139 firms tested outside the crisis period)		1176
SUB-SAMPLE		
(4) Benchmark Group (EA) available	36	36
(5) Benchmark firms (EA) captured in above sample set for Control purposes	7	28
(6) Total firms available (MA) without Benchmark firms	109	150
(7) Total observations for mandated firms (MA) over 4 years - Pooled Firm-year Cross-sectional regression	436	
- December- FYE	268	
(8) Total observations for mandated firms (MA) over 8 years - Crisis Period		1156
- Non-crisis Period		600
		556

* ‘Early adopters’ are formed by the voluntary adopters and cross-listed firms to the U.S.

Table 7A and 7B (on the previous page of 110) also present the sample size for the benchmark group (EA) in this study. In Table 7A, for the main analysis, there are only five early adopters (EA) being employed in the benchmark sample. In Table 7B, for firm-year cross-sectional regressions, there are seven to eight EAs. Obviously, small sample group is a limitation in the DID analysis, but not for the cross-sectional regression analysis because the later only account for the impact of this legal reform to IRF on mandatory adopters (MA). In the DID analysis, the propensity scores of five EAs are matched against eighty MAs based on the factors of size and leverage (agency costs). The issue of whether the propensity scores matching analysis is compromised by having five EAs from the benchmark group can be solved if there are at least 30 firms³⁹ being matched in the propensity scores matching analysis. In Appendix 10 (page 243), it shows that out of 85 sample firms, there are 30 (35 percent) large firms, which means at least 30 firms can be matched on size. Despite of small benchmark group is used in this study, the matching method⁴⁰ (as discussed on page 254) used for DID analysis matches each EAs to more than one MAs based on propensity scores computed, instead of one-to-one matching. Moreover, the overall conclusions based on the results (as shown on Table 16) for the main analysis are still hold even if the sample set has been trimming up to 10 percent in order to get rid of those outliers. Finally, the DID methodology utilises bandwidth as a smoother, where large bandwith value is used for small sample, and vice versa. For instance, in this study (refers to the paragraph one and the footnote 52 on the page 256), “large bandwith value of 0.6 and 0.8 are used for the small sample. This is to ensure that at least 60% or 80% of the total observations centering on the focal point fall into the span for matching (Guo & Fraser, 2010, page 263)”.

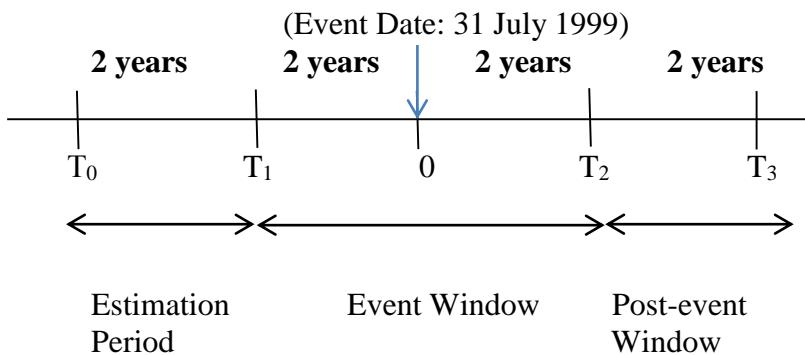
³⁹ According to the rule of thumb of research method, the researcher needs a minimum of 30 observations to run a test analysis.

⁴⁰ kernel-based matching

In Table 7B Column 1, under Fiscal year column, it shows that 116 firms with 464 observations are used for the two-year “event window”. The full sample contains of 109 mandatory adopters (MA) with 436 observations (EADs /Windows) and 7 early adopters (EA / Benchmark group). For mandatory adopters, 109 out of 116 firms are used in the robustness tests for firm-year cross-sectional regression and 67 firms with 268 EADs are selected for sensitivity analysis on MA with December-financial year end (FYE). These firms have complete data and earnings announcement dates available.

For fiscal year analysis, the “event window” of legal reform to IRF covers two financial years before and after the transition year of 1999, where the effective date of legal reform fell on 31 July 1999 (refer to Figure 4 below). Hence, the selected sample data covers the Balance Sheet date from 1 February 1996 to 31 December 2002. The balance Sheet date is used to allocate the earnings announcement dates to mid-year or a specific quarter in the financial year of each firm in this study. The “event window” is the immediate two years period before and after year 1999.

Figure 4: Timeline for Event Study



Since this is a longitudinal data analysis, constant sample size for fiscal year analysis is crucial in order to ensure consistency of estimates in both pre- and post-legal reform periods. To serve this

objective, two artificial windows are created in one year for the pre-legal reform period to make a total of four earnings announcement dates in this period. The artificial windows in the pre-legal reform period come from the same day of the year as the two extra quarterly earnings announcements after the legal reform. The details on the basis and application of artificial window are given in Section 5.3.

Table 7B Column 2 shows the number of firms used in the test of crisis effect. 150 mandatory adopters (MA) with complete EADs and Buy-and-hold returns are used for an extended eight-year test period. A comparison between crisis and non-crisis period requires an extension of period for two years before and after the “event window”. In the Calendar year analysis, there are 150 firms with 600 observations in the test sample of crisis period for two-year “event window” immediately before and after the legal event, and 139 firms with 556 observations in the sample set of non-crisis period, for the two-year extension that falls outside the crisis period. Constant sample size with panel data used in this calendar year analysis results in a total of 1156 observations for eight years used to allow consistency in comparison of test results between crisis and non-crisis period on a firm-year basis.

This study excludes the benchmark group (EA) from the full sample set (sample set that includes MA and EA) in most of the analyses except for the main analysis and alternative tests of DID. This is because the study aims to investigate the effectiveness of legal reform to higher reporting frequency on mandatory adopters (MA). The benchmark group is the sample data set for early adopters (EA) that practice quarterly reporting before the legal reform to IRF, these include voluntary adopters and cross-listed firms to ADR in United States. In this empirical study, firms

which have quarterly earnings announcement made once or more than once right before the effective date of legal reform to IRF are classified as voluntary adopters. From Table 7B, the benchmark group is formed by 36 early adopters (EAs), and only 5 EAs have been used in the main analysis. Even if the propensity scores matching (PSM) is compromised by the small number of early adopters in this study, the findings of extensive robustness tests have generally supported the main findings of DID with PSM. Hence, the conclusions made from the main analysis may still hold.

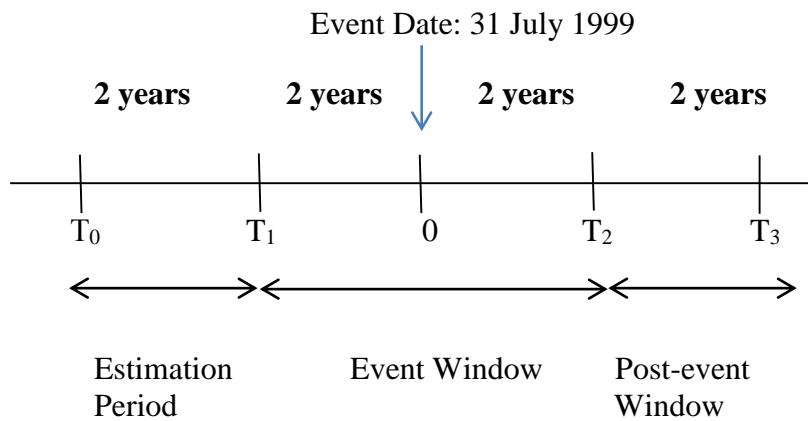
Finally, in the sample selection, prior to the creation of artificial window, firms with fewer than two semi-annual announcements at the pre-legal reform period and four quarterly announcements at the post-legal reform period are excluded from the sample set. Firms that commenced on or after 1 February 1996 and ceased in operation before 31 December 2002 are discarded. Thus, the selected firms are existing firms that make complete periodic earnings announcements as required by law within the test period. Lastly, for all selected firms, daily price data available must be available for at least 264 (based on two years average) trading days.

5.2.2 Event Study and Test Period

Timeline for Event Study

In this study, event-study methodology is applied to compute the outcome of market responses to increased reporting frequency (IRF) at two-time-points. The market response is proxied by equity returns surrounding the earnings announcement date, i.e. buy-and-hold (BH) returns in the main analysis and absolute cumulative abnormal returns (ACAR) in robustness tests under Section 5.6.4. The event is the government's legal reform mandating adoption of four-quarterly reporting regime with an effective date of 31 July 1999.

Figure 4: Timeline for Event Study



Source: (MacKinlay, 1997)

With reference to Figure 4 above, the event date of 31 July 1999 is the effective date of legal reform to IRF, day '0'. The event window is the period around the event date (interval T_1 to T_2). In this case, it refers to fiscal year of 1997-2002, where 1999 is the 'event year', a transition period that has been excluded from the test period of this legal event. All the main analysis and robustness tests, except for analysis on Crisis Effect, are tested on fiscal year basis. The

‘estimation period’ (interval T_0 to T_1 , year 1995-1996) and the ‘post-event window’ (interval T_2 to T_3 , year 2002-2003), where normal return is expected, are tested on calendar-year basis. Both the estimation period and post-event window period are extended test period outside the crisis period. Hence, it is important to note that this study is conducted in event time, not calendar time, unless specifically stated.

Test Period

The main analysis is performed on fiscal year basis for a period of four years, for financial year ended 1997 to 2002, two years before and two years after the event of legal changes. The test period starts from 1 February 1996 to 31 December 1998, where the financial year ended for all firms fell within the year ended 1997 and 1998. Year 1999 is excluded as a transition year. This is to get rid of possible noise from specific firms that may need time to absorb the legal changes and investors may also take time to be aware of the usefulness of the more frequent periodic reporting. The period of post-legal reform starts from 1 February 2000 to 31 December 2002, which the financial year ended of all firms fall within the year ended 2001 and 2002.

Table 8: Test Period - for main analysis and robustness test

Basis	Started year	Period covered
I. Fiscal Year	Financial Year Ended	1997-2002
II. Calendar Year	1 January 1995- 31 December 2003	1995-2003
(a) Crisis Period -Exclude Transition Year (1999)		Pre-reform 1 Jan 1997-31 Dec 1998 Post-reform 1 Jan 2000-31 Dec 2001
(b) Non-Crisis Period -Exclude Crisis Period (1997-1998; 2001)		Before pre-reform 1 Jan 1995-31 Dec 1996 After post-reform 1 Jan 2002-31 Dec 2003

The robustness test on the crisis effect is performed by extending the test period to post-event window, which covers two years before pre- legal reform period and two years after post-legal reform period. The tests present a comparison of the impact of legal changes between two periods of time, crisis period versus non-crisis period. The aim the crisis test is to ensure that the expected results hold outside the crisis period. It is expected that the crisis period may be abnormal and obscure the results. Table 8 shows that Crisis effect is tested under calendar year basis. If the crisis effect of higher reporting frequency is tested under fiscal year basis, the crisis effect to some of the firms may be different in each of the financial quarter. This is because each firm has its own date for financial year end, thus, the first quarter of two firms with different financial year end may fall in different month. For instant, since the Asian Financial Crisis took place in July 1997, the financial performance of firms with quarter one fell on March 1997 would not be affected by crisis as compared to those firms with quarter one fell on September 1997.

Event Study

Following the Thornton (2013) and Gagnon (2011) discussions on the reasonable evidentiary standard, from statistic perspective, it is crucial to identify whether the evidence obtained from using event-study methodology is sufficient to lead to a reasonable person to conclude that higher frequency of periodic financial announcement and report affects market efficiency. How the quality of evidence can be identified sufficiently is subject to the statistical significance of the announcement effect obtained and if the effects are attributable solely to the legal reform to IRF (Thornton, 2013). In this study, I first analyse the earnings announcement and reports effects using event study analysis by comparing the changes of information content and timeliness (CICT) before and after the legal reform to IRF. Next, after considering the time-variant effect, I

benchmark the firms in the mandatory adopter (MA) group against the early adopters (EA) group using a matching method. Propensity scores are used to match between the two groups. The scores are computed based the conditional probability of the firm's characteristics. These steps are similar to and performed in the Difference-in-differences (DID) methodology, which aims to get rid of the effects of other factors and any possible effects of other legal reforms during the same test period.

This event-study is designed to look at the response of investors via equity prices. It is to examine whether after receiving more frequent interim reports under new four quarters reporting regime, there are higher responses from investors in the post legal reform period than the pre-legal reform period. This is aimed to highlight the important of the frequency of periodic reports and earnings announcements. When investors response actively to news, average Buy-and-Hold (BH) returns surrounding EADs become higher in an efficient financial market. (Thornton, 2013). When new information is expected, it may trigger less response from investors. Normally, investors will react more aggressively to the unexpected news than the expected one. When there is no news, it is difficult to determine why there are changes to equity prices. (Gagnon, 2011). Since the artificial window⁴¹ is the EAD at pre-legal reform to IRF period that are based on post legal reform periods' EAD, they are indeed non-genuine announcement and reporting dates. Hence, I expect that there should be no news from the artificial windows. However, if there is significant return observed surrounding the artificial window, the outcome could be due to other announcements or other factors that are unknown. Hence, any significant correlation between artificial window return and annual return observed must be 'news', because the effect of the new information is unexpected. Again, following the Thornton (2013) and Gagnon (2011), I

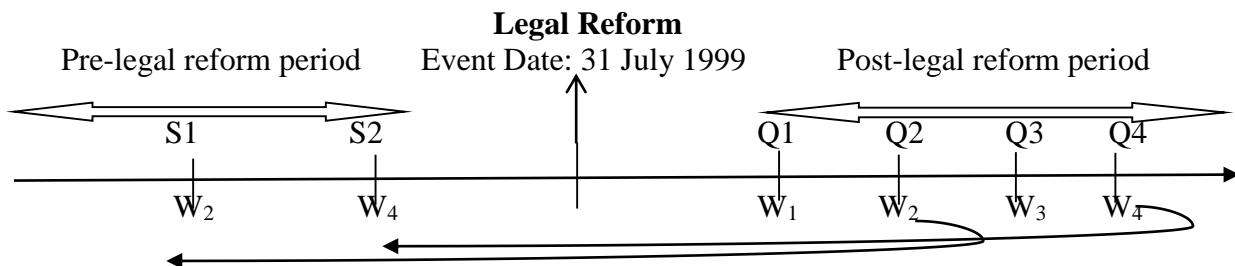
⁴¹ Artificial window has been explained separately under Section 5.3.

identify whether: (1) if there is ‘news’; (2) how much of changes are solely due to higher reporting frequency.

Application of Event-Study

In this event-study, I observe the equity price changes surrounding the earnings announcement and financial reporting date (refer to Q_1 to Q_4 in Figure 5) in short term window. The firm-specific changes of window returns in 3 days (-1, +1) surrounding the earnings announcement events over the test period are measured. Next, I compare the changes of information content and timeliness for all windows over the test period under bi-annual reporting regime to four-quarter reporting regime. The purpose is to capture the changes of investor’s responses to the earlier arrival of news (MacKinlay, 1997) after legal reform. The outcomes of the analysis determine the improvement of market efficiency and information symmetry due to significant responses of investor to earnings announcement and financial reporting after the legal reform to IRF.

Figure 5: Event Study Methodology



Where, S represents firm’s semi-annual earnings announcement date for bi-annual (S_1-S_2) reporting regime; Q represents firm’s quarterly earnings announcement date for four-quarter (Q_1-Q_4) reporting regime, with four event-windows (W_1-W_4) a year. W denotes periodic earnings

announcement event window within a financial year. The event windows in the pre-legal reform period are represented by W_2 and W_4

After this legal reform, lower buy-and hold (BHR) equity returns and abnormal returns for the existing windows of W_2 and W_4 in the post-legal reform period may indicate a reduction in information content and timeliness around these windows due to higher reporting frequency. Hence, lower ‘surprises’ are expected at W_2 and W_4 since news is delivered at a faster speed by having two additional earnings announcement dates/ windows (W_1 and W_3) under quarterly reporting regime. Quarter three (Q3) is expected to show highly significant results because firms would have disclosed three-quarters of confirmative information on operating performance to public investors before their report on financial year end.

Summary

In summary, the test period is set for two fiscal years before and after the legal reform to IRF, and only extends to four calendar years before and after the legal reform to IRF in order to capture the effects of higher reporting frequency outside the crisis period. In DID methodology, I employ event study model to examine time-variant effect, and follow by matching on MA and EA to identify the net effects from the legal reform to IRF.

Table 9 (on the next page) demonstrates the design of window length used for the event-study analysis. The window length is utilized to measure buy-and-hold (BH) returns for cross-sectional regression and to compute absolute cumulative abnormal return (ACAR) over time to investigate for a change in information gap. The buy-and-hold returns account for short window (-1, +1) and

the abnormal returns, ACAR, are measured from the changes in equity prices surrounding the earnings announcement and financial reporting date (EADs) for window width (-45, +2) as stated below. (Ball & Shivakumar, 2008). Chow test is performed to obtain statistic differences between the coefficients of the two periods. A significant t-statistic in Chow test may indicate changes to information content⁴² and timeliness.

Table 9: Window Width of Measurement Outcome used in Event Study

Measurement Outcome	Window Width	Variable Measurement	Expected results
1. Information Content and Timeliness (CICT)	(-1, +1) Short Window	The 3-day buy-and-hold (BH) returns for (-1, +1) are computed for each periodic reporting date for two years before and after the event window. The purpose is to measure the changes in information content after the legal reform event. (Ball & Shivakumar, 2008).	Expected results: stronger association between annual returns and window returns at post-legal reform period, with significant statistical difference between pre- and post-legal reform period, indicates an increase in information content after legal reform.
2. Information Gap	(-45, +2) Two months before the EAD	3-month absolute cumulative abnormal returns (ACAR) are measured for the 6 th and 12 th months (which are referred as window 2 and window 4 in this study) for each firm each year for two years at pre- and post-legal reform period.	Expected results: the gap of abnormal returns between pre- and post- legal reform period have reduced after legal reform event. This may indicate smaller information gap between the informed and uninformed investors.

⁴² Information content refers to news that may change the investor expectation on the outcome of coming events (Beaver, 1968).

The various window widths were set, such as (-60, +2) and (-45, +2) to (+1, +2) for the tests of information gap. Theoretically, when there is higher reporting frequency, the ACARs of quarter two and four in the post legal reform period would be reduced if compared to the same quarters in the pre-legal reform period. In this study, ACAR is computed from two months before the EAD to the second day after the EAD. For example, a graph is plotted for the ACAR from window width (-45, +2) to (-1,+1). The abnormal returns were calculated for (-45, +2), (-44, +2), (-43, +2)..... (-2, +2) and (-1, +2). ACAR for window width (-45, +2) refers to the abnormal returns computed based on a share was bought 45 days before the EAD and being sold 2 day after the EAD.

After the legal reform to higher reporting frequency, there will be four quarters of reporting period, and there will be information spill over after the EAD for the less efficient market. Since the period prior to the two months before current the EAD, such as (-60, +2) to (-46, +2) may be affected by previous EAD, it is more appropriate to measure the abnormal return from day 45 before the EAD to day 2 after the EAD.

5.2.3 Sample and Descriptive Analysis

Descriptive Statistics

Table 10 Part (a) presents descriptive summary for dependent and independent variables used in the main DID model of this study. The mean of each variable seems to lean towards the average figure between the minimum and maximum without skew, except for the mean of quarter two. The mean of quarter two (RWin2) is skewed towards the minimum amount. Quarter three and four (RWin 3 and 4) show positive mean returns which could be explained by more confirmative financial information of firm's performance available after six months in operation. The size is measured as log total assets. The agency cost is an indirect measure of corporate governance due to institutional monitoring and corporate transparency, using the level of leverage.

Table 10: Summary of Descriptive Statistics

Table 10 Part (a) presents the descriptive summary of the dependent and independent variables used in the Heckman's DID model of this study. Table 10 Part (b) is the Pearson Correlation results for selected variables. The data included covers 340 firm-year observations (85 firms over 4 years) for the test period within fiscal year of 1997-98 and 2000-02. AnnualR denotes Annual Return, RWin denotes Window Return. N is the number of observation and Std Dev is the Standard Deviation.

(a) Descriptive Statistics

Variable	N	Mean	Std Dev	Minimum	Maximum
AnnualR	340	-0.02429	0.33769	-0.99997	1.24535
RWin1	340	-0.00328	0.05862	-0.24234	0.37471
RWin2	340	-0.00828	0.06991	-0.36416	0.56410
RWin3	340	0.00286	0.06834	-0.26848	0.35211
RWin4	340	0.00213	0.06845	-0.21904	0.36667
Size	340	13.77050	1.58985	10.13978	17.85971
Agency	340	-0.19456	1.56893	-8.88045	8.28843

Generally, the selected sample data is quite normal. A further detail analysis was performed on a larger sample data set of fiscal year basis than the sample set used in the main analysis. This set of data is used for robustness tests (as stated in Appendix 4). All the panels in Appendix 4, the full sample (Panel A), mandatory adopters (Panel B) and Early adopters (Panel C) show skewness within ± 2 , where skewness below or at ± 3 is a normally acceptable level.

Appendix 6 shows the results of the descriptive statistics performed on an expended set of sample data with calendar year basis. The data were logarithmic transformed for normality and sensitivity check. The statistic outcomes of logarithmic transformed buy-and-hold returns (BHRs) obtained (in appendix 6) are found quite consistent with the statistic outcomes of arithmetic BHRs (in Appendix 4). In short, the sample data sets used in this study are considered normal.

Table 10 Part (b) (on the next page) presents the Pearson correlation coefficients for selected variables used in the main DID model of this study. Sample includes 340 firm-year observations for the period 1997-2002. The results exhibits that annual return is positively correlated to all quarterly window returns. Particularly, the annual return is significantly correlated to window return at quarter two and three (RWin2 &3). It is normal to find that the return at window 3 is highly and positively correlated to window 2. The same correlation noted between the returns at window 4 and window 3, suggesting that the aggregate and cumulative financial information is useful and its influence may spill over to the next quarter. In addition, only return at quarter four has significant correlation to size but negative, indicating that the quarter four financial reporting announcement may be more important to the smaller firms. Finally, the size is found

significantly and negatively associated with the agency cost, suggesting that large corporation may have a lower agency cost. Overall, since the main analysis in this study is using Heckman's DID model, heteroscedasticity (non-constant variance) or endogeneity (dependence of data) would not be a concern as this model of Heckman's DID accounted for these issues.

Table 10: Summary of Descriptive Statistics

(b) Pearson Correlation

Pearson Correlation Coefficients, N = 340 Prob > r under H0: Rho=0							
	AnnualR	RWin1	RWin2	RWin3	RWin4	Size	Agency
AnnualR	1.0000						
AnnualR							
RWin1	0.0236	1.0000					
RWin1	0.6777						
RWin2	0.1822	0.0547	1.0000				
RWin2	0.0007***	0.3145					
RWin3	0.2930	-0.0390	0.1635	1.0000			
RWin3	<.0001***	0.4737	0.0025***				
RWin4	0.0383	0.0138	0.0275	0.1986	1.0000		
RWin4	0.4818	0.8005	0.6131	0.0002***			
Size	0.0378	0.0379	-0.0241	-0.0398	-0.1352	1.0000	
Size	0.4869	0.4860	0.6578	0.4650	0.0126**		
Agency	0.0256	0.0271	-0.0074	-0.0060	-0.0212	-0.2663	1.0000
Agency	0.6383	0.6184	0.8917	0.9127	0.6974	<.0001***	

** and *** are significant at 0.10 and 0.05 respectively.

Appendix 4 and 6 shows some additional work of descriptive statistics on fiscal year basis and calendar year basis. The discussions are disclosed in Appendix 5.

5.3 Artificial Window and Test of Randomness

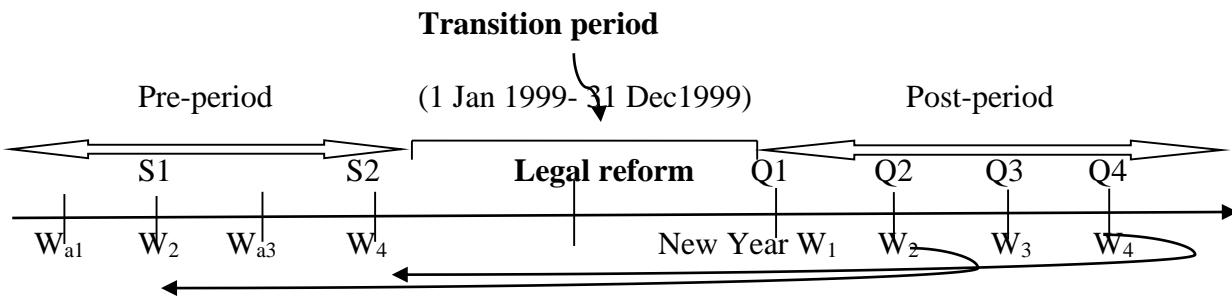
To allow like-with-like comparison, a methodology using an artificial window is applied for the bi-annual reporting period. Since under bi-annual reporting regime, public listed firms were originally required to make two earnings announcements in a year, two artificial windows are created and added to the two existing reporting windows. This has formed a four windows setting and created an equivalent number of windows in the pre-legal reform period relative to the post-legal reform period.

5.3.1 Artificial Windows

In the pre-reform period, there are only two semi-annual earnings announcement in a year. To allow like-with-like comparison, the quarterly earnings announcement dates (thereafter EADs) at the post-reform period for window W_1 and W_3 have been used to create artificial windows in the pre-reform period. The aim is to predict the abnormal window-returns around these artificial windows of W_{a1} and W_{a3} in the pre-reform period. This creation of artificial window would allow a more balanced comparison of legal effect to changes in information environment with four event-windows in both pre- and post-periods. The results obtained from the analysis on two EADs at pre- and post-legal reform periods (Heflin et al, 2003) may be different from those obtained from four EADs at both periods.

The two artificial windows (W_{a1} & W_{a3}) are created for bi-annual regime to make the number of windows equivalent for both regimes (refer to Figure 6 on the next page).

Figure 6: Creation of Artificial Window (W_{a1} & W_{a3})



Since R-square increases with increased variables in a regression, adjusted⁴³ R-squared (hereafter named R^2) is used to smooth the problem of increase in R^2 when an extra explanatory variable being added even though it is useless. Adjusted R^2 measures the percentage of variation of firm's annual stock return that is explained by window returns at the earnings announcement date (Ball & Shivakumar, 2008). A Chow test is performed to test for significant differences between the coefficients of the two periods. A significant t-statistic in Chow test may indicate changes to information content⁴⁴.

Since these are non-genuine earnings announcement dates, the returns measured around these EADs are expected to be a random walk. However, these window returns may be significant at any point of time during the crisis period. Thus, a test of randomness is carried out.

⁴³ In fact, adjusted R^2 may reduce with any useless variables added. A negative adjusted R-square may indicate that the extra variable is seemed to add less information to the model than when it is excluded. (Studenmund, 2006).

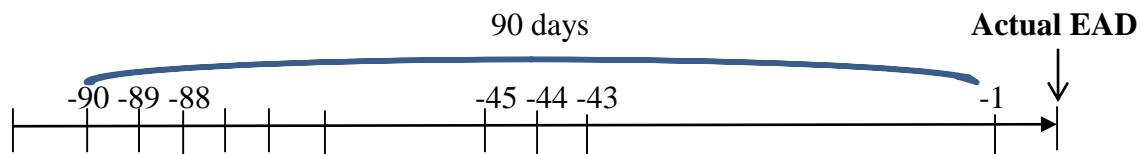
⁴⁴ Information content refers to news that may change the investor expectation on the outcome of coming events (Beaver, 1968).

5.3.2 Test of Randomness

The date of the artificial announcement events selected for pre-legal reform period are based on the real earnings announcement event dates at the post-legal reform period. It is assumed that any period is simply selected from a random distribution unless there are systematic factors at these dates. Any date within that period should make no different to the outcome since there is no official earnings announcement made within this 90 days term.

Specifically, any 3-day window that is selected within the 90 days (-90, -1) before an actual six-monthly EAD is assumed to provide a buy-and-hold return that is similar to the moving average of all 3-day window returns (RET) throughout the 90 days term before this actual EAD. The expected results from the Test of Randomness on artificial window of treated group (Mandatory Adopters, MA) is there is no significant differences between the average returns over 90-day and the 3-day artificial window returns. The artificial EADs created are expected to be a random walk.

Figure 7: Test of Randomness on 90-day window



Null Hypothesis for the test of randomness is set as below:

$$H_0 : \text{Ret}_{ki} - \underline{\text{RET}}_{ki} = 0 \quad \text{equation (17)}$$

Where, k is the firm in the sample set and i is the number of the artificial quarter/ window.

The t-statistic of the null hypothesis is expected to be not significant to provide evidence of randomness in the artificial window application.

Formula:

$$\text{Ret}_{ki} = [(P_t - P_{t-3}) / P_{t-3}] , \text{ where } t = \text{day -1 to -90}$$

$$\underline{\text{RET}}_{ki} = 1/n \sum \text{RET}_s , \text{ where } s \text{ is 1 to 89 for moving average}$$

5.4 Measurements of Variables

5.4.1 Return Measurement: Buy-and-hold Return (BHR)

Return Measurement

In this study, there are long term and short term equity returns measured for the analytical purposes. Annual returns are long term returns; they are the buy-and-hold returns (BHRs) calculated from daily prices for a year. Window returns are short term returns; they are computed as the variations of share prices surrounding the earnings announcement dates. The window buy-and-hold returns are computed over short term windows of day (-1, +1), where day “0” is the earnings announcement day. Specifically, annual returns and window returns are measured based on the formula below:

$$R_{i,t} = [\prod (1 + r_{i,t})] - 1 \quad \text{equation (1)}$$

Here,

$R_{i,t}$: Measure of buy-and-hold return from 1 day before to 1 day after (-1,+1) an earnings announcement date for window returns and day 1 to the last trading day in a year for annual returns;

$r_{i,t}$: Arithmetic returns = $(P_t / P_{t-1}) - 1$

$$\begin{aligned} R_{i,t} (\text{Annual}) = & \alpha + \beta_1 R_{i,t} (\text{Window 1}) + \beta_2 R_{i,t} (\text{Window 2}) \\ & + \beta_3 R_{i,t} (\text{Window 3}) + \beta_4 R_{i,t} (\text{Window 4}) + e_{i,t} \end{aligned} \quad \text{equation (2)}$$

The buy-and-hold daily returns are compounded over their respective holdings period rather than cumulated for a better accuracy in estimation. The buy-and-hold daily returns are compounded over their respective holdings period rather than cumulated for a better accuracy in estimation. In

this study, BHR is used to track the changes in information content and timeliness, in order to examine the overall improvement of the information environment after this legal reform to IRF. Different from BHR, ACAR is used to examine timeliness of information, whether the information provided via more frequent reports may reduce the shocks to investors after more earnings announcements are made. ACAR is based on cumulative absolute abnormal returns to remove the offsetting effects of firm-specific good news and bad news in the metric. The formula to calculate ACAR is as below:

$$\text{ACAR}_{i,x} = |\prod_{t=-x}^{+2} (1 + \text{AR}_{i,t}) - 1| \quad (\text{Heflin et al., 2003}) \quad \text{equation (13)}$$

Abnormal return ($\text{AR}_{i,t}$) is obtained from $R_{i,t} - E[R_{i,t}]$, minus logarithmic market index return (estimated return) from return on firm equity i at time t .

5.4.2 Change in Information Content and Timeliness (CICT)

This study refers to Ball and Shivakumar (2008)'s approach in assessing the importance of quarterly reporting as a timely resource in contributing towards total information environment. The change to information content and timeliness (CICT) is measured by the change in strength of the association between annual returns and window returns surrounding earnings announcement dates. In this study, the change to information content refers to increase/ decrease of news released due to IRF that is relevant and thereby influences on investor's investment decisions; and the change to timeliness in this context is the earlier (more rapid) arrival of news due to IRF. In short, CICT captures the change in the proportion of total information incorporated in security prices over a year that is explained by the periodic announcements (semi-annually / quarterly earnings announcements) during the year (Ball & Shivakumar, 2008).

From equation (2),

$$R_{i,t}(\text{Annual}) = \alpha + a_1 R_{i,t}(\text{Window 1}) + a_2 R_{i,t}(\text{Window 2}) \\ + a_3 R_{i,t}(\text{Window 3}) + a_4 R_{i,t}(\text{Window 4}) + e_{i,t}$$

Where, the annual returns and window returns are computed from buy-and-hold return (BHR) from equation (1),

$$R_{i,t} = [\prod (1 + r_{i,t})] - 1$$

In the main analysis, the measurement of CICT is based on the buy-and-hold returns (BHRs) rather than ACARs because the differences of CICT indicate the changes to the total information environment. However, ACAR is a measure of abnormal return in order to assess the magnitude of the surprise surrounding an EAD. Thus, the reduced ACARs after this legal reform to IRF indicate a smaller gap between informed and uninformed investors in the financial market due to fewer shocks to some investors in the post-legal reform period than pre-period.

5.4.3 Absolute Cumulative Abnormal Return (ACAR)

To assess the changes in information gap (Section 5.6.4), daily prices are used to calculate absolute cumulative abnormal returns (ACAR) surrounding the earnings announcement dates. The data used in these tests is the half yearly announcement date available from Datastream (under world scope database of Thompson) and daily prices. Abnormal return ($AR_{i,t}$) is obtained from $R_{i,t} - E[R_{i,t}]$, minus logarithmic market index return (estimated return) from return on firm equity i at time t .

$$\text{ACAR}_{i,x} = |\prod_{t=-x}^{+2} (1 + \text{AR}_{i,t}) - 1| \quad (\text{Heflin et al., 2003}) \quad \text{equation (13)}$$

Where,

$\text{ACAR}_{i,x}$: measure the absolute change in price from x days before to two days after an earnings announcement

$\text{AR}_{i,t}$: Abnormal returns $= R_{i,t} - E[R_{i,t}]$

where, estimated return, $E[R_{i,t}]$ is logarithmic market index return

ACAR is based on cumulative absolute abnormal returns to “remove the offsetting effects of firm-specific good news and bad news in the metric.”

5.4.4 Explanatory Variables

Table 11: Measurement Variables

Table below presents the description and the way of measurements to each of the variables used in this study.

Variable	Description
ACAR	ACAR denotes absolute cumulative abnormal return. It measures the absolute change in price from x days before an earnings announcement date to two days after the EAD.
BHR	BHR denotes buy-and-hold return. It is the return computed from the day the equity is purchased to the day the equity is sold. i.e, for a window BHR, it is computed over short term windows of day (-1, +1). The day “0” is the announcement day.
CICT	Changes in information content and timeliness.
Mean	Mean return is the average return over a test period.
MA	Mandatory adopters cover firms that are required by law to adopt quarterly reporting effective from 31 July 1999.
EA	Early adopters include firms cross-listed to ADR in U.S and voluntary adopters of quarterly reporting.
AnnualR	Annual return refers to one year buy-and-hold return measured on fiscal year basis.
WinR	Window returns is a measure of 3-day buy-and-hold window return surrounding the earnings announcement event.
WinR _{iq}	Window returns for firm i window q (where q= 1,2,3&4) is measured to allow details analysis of marginal changes of each individual window.
POST	POST is a variable of reporting regime period for pre- and post-legal reform. Assign 1 to post, zero otherwise.
POST*MA	This is an Interaction term, which the estimated coefficients represent the Difference-in-differences (DID) of outcome variable, $E [Y_{1t} - Y_{0t} D=1]$
Size	The firm size is the log total assets of the financial year.
Agency	Proxy by agency cost, a component of corporate governance, measure the management self-benefits on shareholder's costs.

5.5 Alternative DID Approach

5.5.1 Comparative Matching Methods

Matching Estimator

For a robustness check, the matching estimator is employed (Abadie & Imbens, 2002, 2006) as an alternative model for treatment effect analysis. Based on the early work of Cochran and Rubin (1973) on a simple matching estimator, Abadie and Imbens (2002) expand the simple matching estimator to a bias-corrected matching estimator. It is a robust variance estimator that adjusts for heteroscedasticity. In this study, I follow the STATA procedure and named this matching method of Abadie and Imbens (2002, 2006) as the k-nearest neighbor matching with propensity scores.

Simple matching estimator (A conventional approach)

The simple matching estimator calculates the Mahalanobis distance for matching. This is invented by Cochran and Rubin (1973), the inventors of propensity score matching. Mahalanobis metric matching is a univariate matching that is also known as ‘nearest available pair-matching’. (Cochran & Rubin, 1973). To apply this method, the research should (1) place the treated observations into a random order; (2) calculate the distance between each treated observation (i.e. MA, in this study) and all controls (EA). The distance (represented by $d(i,j)$) is the Mahalanobis distance between a treatment observations i and a non-treated observations, j .(Guo & Fraser, 2010):

$$d(i,j) = (u-v)^T C^{-1} (u-v) \quad \text{equation(8)}$$

where, u and v are the matching variables for the MA (treated, i) and EA (non-treated, j). C is the sample covariance matrix of the matching variables from the full set of non-treated (EA). (Guo & Fraser, 2010).

However, Mahalanobis metric matching is not based on a one-dimension score. The average Mahalanobis distance between observations increases with the increases in number of covariates. There could be issues of finding close matches when there are many covariates involved in one model. (Guo & Fraser, 2010, Page 146). This is nevertheless overcome by Abadie and Imbens (2002, 2006) in their development of matching estimators.

K-nearest neighbor matching method

To overcome this limitation, Abadie and Imbens (2002, 2006) include an additional covariate, the estimation of propensity score, in the Mahalanobis metric matching. The combined method of Mahalanobis Metric Matching and Propensity Score is also named K-nearest neighbor matching method. Different from the Mahalanobis metric matching, they estimate (1) average treatment effects for untreated (ATU); (2) treatment effects that include both sample and population estimates; (3) variance and standard errors for statistical significant tests, and (4) when Mahalanobis metric matching is not exact, they estimate a bias correction for finite samples. They assume that (1) independent of the treated to outcome with conditional on covariates, which means, in this case, MA is independent of CICT with the control on size and agency costs; (2) the probability of being treated is ‘bounded away’ from 0 and 1. This is an overlap assumption where sufficient overlap in the distributions of the observed covariates is required. (Abadie et al., 2004).

K-nearest neighbor matching and analysis procedure in Stata program

Abadie and Imbens (2002, 2006) combine the Mahalanobis Metric Matching and Propensity Score matching, and have developed a program for a matching estimator named '*teffects psmatch*' (currently available in the new version of Stata version 13). This '*teffects psmatch*' for k-nearest neighbor matching is used for variance estimator that adjusts for heteroscedasticity. Another procedure in this new program is '*teffects nnmatch*'. It is used for conventional nearest-neighbor, Mahalanobis metric matching. In the old version of the Stata program, by default, '*nnmatch*' uses the simple matching estimators (Abadie, Dukker, Herr & Imbens, 2004). The user must specify the commands for bias adjustment and estimation of heteroscedasticity-consistent standard errors.

According to the STATA manual, the difference between '*teffects psmatch*' and the old commands of '*psmatch2*' procedure is that 'the former when measures standard errors has taken into account that propensity score is estimated'. Thus, the standard errors obtained in the matching estimator of Abadie and Imbens (2002, 2006) under the commands of '*teffects psmatch*' and '*teffects nnmatch*' may be larger than the standard errors produced by propensity score matching for the nearest neighbor method that is using '*psmatch2*'. Therefore, '*teffects psmatch*' (Abadie and Imbens, 2002, 2006) has been used as an alternative analysis to investigate if there is difference in standard errors produced by these two set of commands.

In addition, Imbens, Abadie and others believe that bootstrapping (refer to Appendix 13) used in Heckman's DID model could be complicated. They thus present the variance estimation in the matching estimators that do not require non-parametric estimation, with no bootstrapping,

bandwidth, or other smoothing parameters that allow them to improve the estimation method with as many covariates and various degree of smoothness.(Guo & Fraser, 2010).

5.5.2 Alternative DID Approach- Cross-Sectional Regression

In empirical economics, the Difference-in-differences (DID) can be obtained with cross-sectional regressions (Wooldridge, 2013) performed in the pre- and post- legal reform period for both MA and EA group.

Table 13: Difference-in-differences for the Cross-sectional regression

	<u>Pre-legal reform:</u>	<u>Post-legal reform:</u>	<u>Differences:</u>
Mandatory Group	$CICT = \alpha_1 + \beta_2 MA$	$CICT = \alpha_1 + \beta_2 MA$	$(\beta_2 Post, MA - \beta_2 Pre, MA)$
Benchmark Group	$CICT = \alpha_1 + \beta_2 EA$	$CICT = \alpha_1 + \beta_2 EA$	$(\beta_2 Post, EA - \beta_2 Pre, EA)$

The outcome of the Difference-in-differences,

$$\Delta_{DID} = (\beta_2 Post, MA - \beta_2 Pre, MA) - (\beta_2 Post, EA - \beta_2 Pre, EA) \quad \text{equation (9)}$$

* the changes of information content and timeliness, CICT is the beta coefficient (β_1) obtained from the regression of annual return on window return : $AnnualR_{it} = \alpha_0 + \beta_1 WinRitq$

Δ_{DID} is the effect of the legal reform on the changes in information content and timeliness that is equivalent to β_1 from the regression:

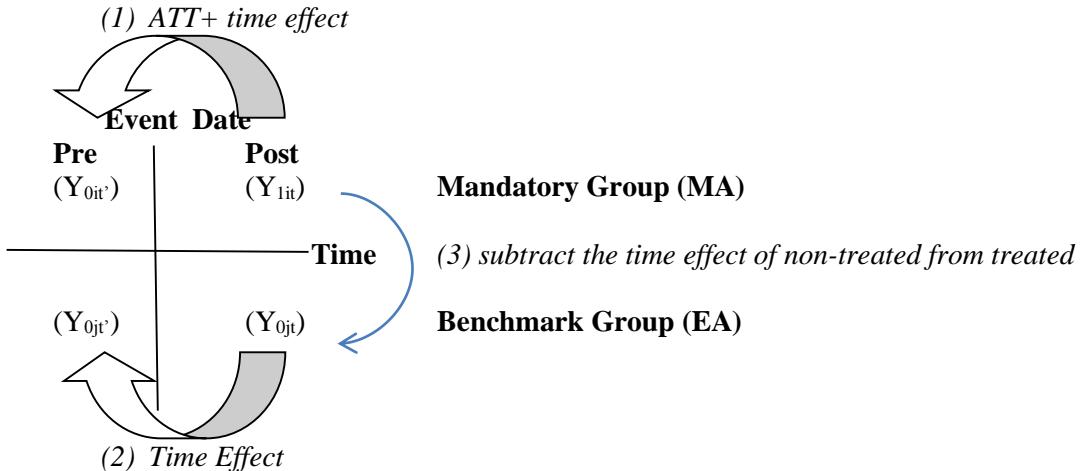
$$CICT = \delta_0 + \beta_0 POST + \delta_1 MA + \beta_1 POST*MA + v_2 \quad \text{equation (10)}$$

Where, β_1 is the ATT estimated from regression.

POST is a variable of reporting regime period for pre- and post-legal reform. Assign 1 to post, zero otherwise. POST*MA is an interaction term, which the estimated coefficient (β_1) represents the Difference-in-differences (DID) of outcome variable, $E [Y_{1t} - Y_{0t} | D=1]$.

In Figure 10 (on the next page), the net treatment effect for the MA (ATT) is that stated in equation (10) above. It is different from Heckman's DID model in terms of the weighting in the estimate. It is assumed that similar time effects occur to the two groups of EA and MA. CICT is regressed against POST, MA and the interaction term of POST and MA for the legal treatment effect, even though MA has high level of collinearity with POST.

Figure 10: Difference-in-differences (Wooldridge, 2013)



Where, ATT denotes the average treatment effect on treated.

An alternative way to present the formula in equation (9) is

$$\Delta_{DID} = E[Y_{1it} - Y_{0it^*} | D=1, P(X)] - E[Y_{0jt} - Y_{0jt^*} | D=0, P(X)] \quad \text{equation (11)}$$

Assume that, $E[(Y_{0it} - Y_{0jt'}) | P(X), D=1] = E[(Y_{0jt} - Y_{0jt'}) | P(X), D=0]$, this means the CICT over two time-points (t and t') for MA group if not treated, should capture the similar time effects as to the CICT over two time-points (t and t') for EA group.

Hence, the Difference-in-differences (Δ_{DID}) in equation (11) accounts for the difference in CICT of the MA group by comparing the treatment effect on CICT of MA group to the CICT of the same group if they are not treated, and follows by deducting the time effect captured in the second part of this equation based on the above assumption.

5.6 Robustness Tests

5.6.1 Firm-year Pooled Cross-sectional Regressions for Mandatory Adopters

The aim of this study is to examine the net effect of legal reform to increased reporting frequency for the group of mandatory adopters (MA). In this study, the pooled and firm-year cross-sectional regressions are performed to investigate the changes to CICT of legal reform to IRF in the individual period (pre- versus post-legal reform to IRF) and individual year for MA, respectively. The objective is to examine the change of market behaviour, which also provide support to the results from the DID analyses. This approach is equivalent to a two period panel data analysis⁴⁵. The results obtained in this test are reliable because only firms with complete data (i.e. firms with 8 earnings announcement returns and all financial data required for analyses) available and listed to financial market within the test period of this study are included in the

⁴⁵ The sample data selected are matched before and after the legal reform, i.e firm_i tested at pre-legal reform period and revisited at the post-legal reform period.

sample. The significant of Chow test demonstrates the significant changes between a bi-annual and a quarterly reporting regime.

Following Ball and Shivakumar (2008), the firm-year cross-sectional regression model is used to test for the arrival of new information at new earnings announcement dates on a yearly basis. Different from Ball and Shivakumar (2008), artificial windows are created based on the earnings announcement dates in the post-legal reform period for the comparison purposes of this test. (Refer to Section 5.3 for further elaboration on artificial window). The artificial windows are used to allow like-with-like comparison in year-to-year basis. This is because there are only two earnings announcement windows at the pre-legal reforms period for bi-annual reporting regime, and four earnings announcement windows at the post-legal reforms period for four-quarterly reporting regime.

Firm-year Cross-sectional Regression

(a) Pre-legal reform:

$$R_{i,t} (\text{Annual}) = \alpha + \beta_2 R_{i,t} (\text{Window 2}) + \beta_4 R_{i,t} (\text{Window 4}) + e_{i,t}$$

With Artificial window:

$$\begin{aligned} R_{i,t} (\text{Annual}) = & \alpha + \beta_1 \text{Art}R_{i,t} (\text{Window 1}) + \beta_2 R_{i,t} (\text{Window 2}) \\ & + \beta_3 \text{Art}R_{i,t} (\text{Window 3}) + \beta_4 R_{i,t} (\text{Window 4}) + e_{i,t} \end{aligned}$$

(b) Post-legal reform:

$$\begin{aligned} R_{i,t} (\text{Annual}) = & \alpha + \beta_1 R_{i,t} (\text{Window 1}) + \beta_2 R_{i,t} (\text{Window 2}) \\ & + \beta_3 R_{i,t} (\text{Window 3}) + \beta_4 R_{i,t} (\text{Window 4}) + e_{i,t} \quad \text{equation (12)} \end{aligned}$$

Where, $[R_{i,t} \text{ (Annual)}]$ denotes annual buy-and-hold returns of firm i at time t ; $[R_{i,t} \text{ (Window}_j\text{)}]$ denotes buy-and-hold returns surrounding earnings announcement date, where $j=1,2,3$ and 4.

5.6.2 December FYE Firms – Regression Model

The third robustness test is performed on the DEC_FYE firms only. Since the test period is within the crisis period, it is important to identify if the results of the effect of legal changes still hold for DEC_FYE firms only. There are 54% (73 out of 136) of MA firms in the sample set are with December financial year end, (Appendix 6 shows that there are almost 58% of the December FYE firms in full sample set that includes both MA and EA).

Firm-year cross-sectional regression on December FYE firms only may be important to ensure that the significant empirical results of this study are not due to seasonality. This test is critical because the systematic differences between December and non-December FYE firms are found to impact on the outcome of treatment effect analysis (Smith and Pourciau, 1988; Aiase, 1985; Defeo, 1986). It could be a possible generalizability concern / limitation due to the year-end restriction (Smith and Pourciau, 1988). For example, Ball and Brown (1968) use only December year-end firms that report a little relevance of annual reports, while Beaver (1968) employs only non-December year-end firms report significant evidence of information content from annual earnings announcements. In addition, December and non-December year-end firms may differ systematically in firm characteristics, such as size and industry, where December year-end firms are larger and less risky relative to firms with non-December year-end for developed economies (Smith & Pourciau, 1988).

Generally, empirical evidence reports that firm's choice on fiscal year-end is influenced by national legislation on fiscal year-end than the cause of seasonality (Kamp, 2002). Even so, firms that choose non-December fiscal year-end are likely to show seasonal pattern in their business because their reports exhibits the natural business cycle of a firm over a year (Kamp, 2002). The practices with diversity of fiscal year-end may be beneficial to the economic policy makers if they intend to identify trends with seasonality. From audit perspective, it may reduce the costs of external auditors with a better job allocation in busy period (Kamp, 2002). However, the test on only December FYE firms allows comparability and generalization. The uniform fiscal year-end of firms in the test sample may capture changes in the business environment (Kamp, 2002), including changes during crisis period, with the same overlapping period that may get rid of the seasonal factors due to different industries.

5.6.3 Crisis Effect – Regression Model

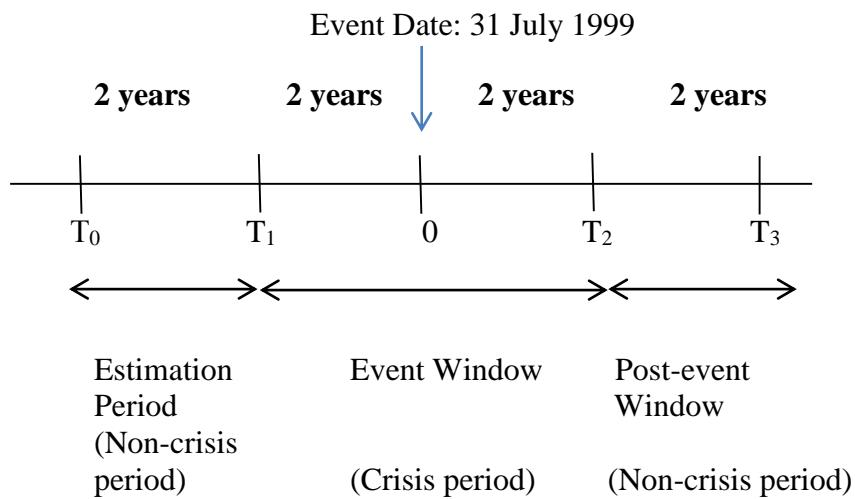
Crisis versus Non-Crisis Period

The financial market is normally less efficient during crisis periods (Gupta, Krishnamurti and Alireza, 2011, a study of developed economies). There is evidence on the market efficiency of 26 emerging equity markets that reports negative relationship between financial crisis and market efficiency (Mensi, 2012).

This additional test aims to explore the effect of legal reform to IRF on mandatory adopters outside the crisis period (1997-1998; 2001). It investigates the impact of the financial crisis on the equity prices and market behaviour of MA firms due to higher reporting frequency. By

comparing the regression results within the event-window (refer to Figure 4 on the next page) of legal reform to the period outside the crisis period (non-crisis period), the outcomes of regressions from this additional test are expected to be more pronounced in the non-crisis period relative to crisis period. These outcomes may indicate that the analysis results are driven by the legal reform and not by the crisis. The test period is extended from two years before and after the legal reform event (year 1997-2001, excluding transition year of 1999), to two years before and after the event window (year 1995-1996 and 2002 -2003) respectively.

Figure 4: Timeline for Event Study



Source: (MacKinlay, 1997)

5.6.4 Information Gap and Timeliness

Information Gap

This section discusses on the contribution of timeliness to the information gap. It is an additional test that provides supportive evidence on the assessment of increased timeliness due to the higher

reporting frequency on investors' behaviour. Following Heflin et al. (2003)'s methodology, in order to assess the change in speed of corporate financial information reaching uninformed investors in the post-legal reform period, I measure the changes of absolute cumulative abnormal returns (ACARs). These measurements present the gaps for the speed of information due to different speed of information reaching investors before and after the legal reform to IRF. A faster speed of information reaching all investors may reduce information gap between the informed and uninformed investors, which may directly result in closer opinion on equity prices among public investors, thereby lower the abnormal returns. Hence, this study uses information gap as a proxy for timeliness, by measuring the absolute cumulative abnormal returns (thereafter named ACAR) surrounding earnings announcement dates for the period before and after the legal reform to IRF. A lower ACAR may indicate a closer information gap after the legal reform to IRF due to increased timeliness. Overall, the information gap captures the differences of investors' responses due to a change in timing of information reaching investors. The finding of lower ACAR at post-legal reform period may indicate a lower level of information asymmetry.

This finding could be important because high information asymmetry may allow informed trader to trade at the costs of uninformed traders. For instance, when the informed trader has private information that firm ABC has cumulative losses at the third quarter of a year, they may sell the equities held in firm ABC immediately before the uninformed trader aware of the news. This assumes that the selling activities occur within a very short period of time. In this case, uninformed traders may have to absorb the losses. Hence, when firms are mandated to practice higher reporting frequency, there will be more reliable information made available to public at

more frequent and timely manner. This will increase the corporate transparency and reduce information asymmetry among equity traders.

Next, I compare Absolute Cumulative Abnormal Returns (thereafter named ACARs) of two existing windows earnings announcements under bi-annual reporting regime to ACARs of quarter two and quarter four earnings announcements under quarterly reporting. The formula of ACARs is shown as below (also stated under Section 5.4.3). The test period covers two earnings announcement windows each year, for two years before and two years after the legal reform to IRF.

Abnormal return ($AR_{i,t}$) is obtained from $R_{i,t} - E[R_{i,t}]$, minus logarithmic market index return (estimated return) from return on firm equity i at time t .

$$ACAR_{i,x} = |\prod_{t=-x}^{+2} (1 + AR_{i,t}) - 1| \quad (\text{Heflin et al., 2003}) \quad \text{equation (13)}$$

Where,

$ACAR_{i,x}$: measure the absolute change in price from x days before to two days after an earnings announcement

$AR_{i,t}$: Abnormal returns $= R_{i,t} - E[R_{i,t}]$

where, estimated return, $E[R_{i,t}]$ is logarithmic market index return

5.6.5 Return Volatility

A simple way to observe the effect of policy / legal changes on market behaviour is to monitor the impact of this event on return volatility over two time-points (i.e. normally is at time t and t').

Average returns are expected to be less volatile during the period of post-legal reform to IRF

than the returns during period of pre-legal reform to IRF and crisis period. This is discussed in Chapter 4 on IRF that reduces information gap due to lower information asymmetry, and results in less difference in opinion among investors that moves market efficiency (under section 4.2.3 & 4.2.4). Since information asymmetry is higher during the financial crisis period, returns may be more volatile due to market sensitivity to news. In general, for the period prior to higher reporting frequency regime, returns are also way more volatile because of the information asymmetry. Hence, higher reporting frequency influences returns synchronicity because more frequent earnings announcements may result in more relevant news announced to public (Yang, 2009), even though Campbell et al. (2001) argue that increase in news announcement increases idiosyncratic volatility⁴⁶. This can be done by plotting a graph of average returns on market equities of MA (treated group) over the test period 1996-2004. The average return is measured using the average changes of the index return.

Following Campbell et al. (2001), to measure the volatility of individual equity returns relative to market, I plot the average index return across firms over nine years (1996-2004). In this case, the return of individual equity is set against market (index) return of Kuala Lumpur Composite Index (currently known as FTSE Bursa Malaysia) to arrive to individual index return. The daily index return capture all the dividend and distributions that are reinvested, which should provide more accurate results than ignoring them. The market return employed in this study is the Kuala Lumpur Composite Index (KLCI) weighted returns.

⁴⁶ Idiosyncratic volatility refers to unsystematic risk that can be diversified away through holding a portfolio of equities.

5.7 Summary

This chapter discusses the research design and methodologies applied to evaluate the effects of legal reform to higher reporting frequency on information content and timeliness. It is designed to compare the two reporting regimes, bi-annual to quarterly reporting regimes at the pre- and post- legal reform period. The main objective of these analyses is to identify the net treatment effect of legal reform to higher reporting on public listed firms that adopt four-quarterly reporting mandatorily.

In this study, I employ the Difference-in-differences (DID) method (Heckman et al., 1997, 1998) to evaluate the average treatment effect on treated (ATT). The study also uses alternative methods to Heckman's DID, the work of Abadie and Imbens (2002, 2006). According to Guo and Fraser (2010), these three models and the Heckman's Correction model are “four closely related but technically distinct models for estimating treatment effects” (Guo & Fraser, 2010). Heckman's Correction model (Heckman et al., 1979) is not employed here because it only accounts for unobservable or omitted variables (refer to appendix 2). Difference-in-differences (DID) with matching method accounts for observable and unobservable bias estimates and minimizes selection bias more efficiently than selection methods.

The chosen method, Difference-in-differences (DID) model, utilizes kernel-based matching of propensity scores (Heckman et al., 1997, 1998) in a two-stage procedure: (1) calculating propensity scores, and (2) applying propensity scores in the kernel based matching model. The DID model combines the two steps mentioned above plus accounting for the time effect. The untreated refers to sub-group that is not influenced by the legal reform to higher reporting

frequency. These procedures help to minimize the possibilities of bias, particularly omission bias. Other treatment effect models for comparison purposes are Abadie and Imbens (2002, 2006) using k-nearest neighbor propensity scores matching, and a conventional nearest neighbor matching ('*nnmatch*') using Mahalanobis distant, Mahalanobis metric matching (Cochran & Rubin, 1973).

Robustness tests include firm-year pooled cross-sectional regression for mandatory adopters (hereafter named as MA), which is to capture the shift of significant in window returns and December FYE firms. The aim is to compare for the changes between a bi-annual and a quarterly reporting regime on MA. The cross-sectional regressions of annual returns on window returns (Ball & Shivakumar, 2008) are demonstrated by using artificial windows. In lieu of whether two EA windows at pre-legal reform period are comparable to four EA windows at the post-legal reform period, artificial window is created. These windows are created for like-with-like comparison of outcome from the analysis. A test of randomness is designed for invented artificial window to confirm the randomness of earnings announcement dates used to calculate the window return in pre-legal reform period. This step is something different from previous studies as it allows a closer monitoring and comparison of changes in association of each quarter's earnings announcement window return to annual returns. These artificial windows have been tested for randomness (refer to Section 5.3.2).

Secondly, I compare December financial year-end (DEC_FYE) firms to all FYE firms to find out whether the impact of legal changes is more pronounced to DEC_FYE firms. A further test on crisis effect is conducted by extending the scope of test period to eight years based on calendar

year basis. It covers the period outside the event window of legal reform to IRF. The aim is to justify if higher reporting frequency has impact on investor behaviour during the crisis period only, or it is also significant during the non-crisis period. It is important to note that main analysis and all robustness tests (other than crisis effect) in this study are based on fiscal year basis. Crisis effect is investigated using calendar basis (Section 5.6.3).

Next, I design a robustness test for information gap. The aim is to capture the increased timeliness due to increases in speed of information reaching investors (Butler et al., 2007) and the shorten gap between the informed and less informed investors (Heflin et al., 2003) after the legal reform. Finally, I test on the effect of legal reform to IRF on return volatility over time. The return should be more volatile during the crisis period and become less volatile when the information asymmetry has been reduced.

CHAPTER 6 EMPIRICAL RESULTS

6.0 Empirical Results

6.1 Average Treatment Effect on Mandatory Adopters

 6.1.1 Main Results: Heckman's Difference-in-differences Model with PSM

 6.1.2 Comparative Matching Methods: Matching Estimator

 6.1.3 Alternative DID Approach: Cross-Sectional Regression

6.2 Robustness Tests

 6.2.1 Effects of IRF on Mandatory Adopters - Regression Model

 6.2.2 December FYE Firms - Regression Model

 6.2.3 Crisis Effect - Regression Model

 6.2.4 Information Gap and Timeliness

 6.2.5 Effect on Return Volatility

6.3 Summary

6.0 EMPIRICAL RESULTS

This chapter discusses the findings from empirical analyses. Table 14 (on page 156) shows a summary of methods and findings for (1) DID analyses, and (2) Firm-year Cross-sectional Regressions. In all the treatment effect analyses and the regression analyses, panel data is used and these data are controlled for heteroscedasticity, i.e. non-constant variance. Artificial windows are used to allow like-with-like comparisons between bi-annual and four-quarter reporting. In this study, the Heckman's correction model (Heckman, 1979) with Inverse Mills Ratios (IMR) is not chosen for robustness check due to its weaknesses as discussed by Lennox et al. (2012) in their recent paper. The unresolved bias issues have however been addressed by the Heckman's model with Propensity score matching technique (Lennox et al., 2012) as employed in this study.

Following Heckman et al. (1997, 1998), this study employs a Heckman's DID model to obtain net treatment effects and the results are presented in Table 16. This method involves two-stage procedure. (1)This model uses logistic (logit) regression to generate propensity scores, and (2) Kernel-based matching method is applied to match the control firms against treated firms and to obtain the kernel estimator. The DID model accounts for time variant effect and use the kernel estimator to compute average treatment effect on mandatory adopters, MA (treated). Table 16 also shows significant results as predicted in hypothesis one and two, where the higher reporting frequency results significant changes to the information content and timeliness. The findings are consistent across the sensitivity tests using different trimming level at 1%, 2%, 5% and 10% on the sample data. Hence, the analysis results provide evidence that suggest higher reporting frequency improves corporate transparency and market efficiency. This legal reform is found

effective by comparing the treated and untreated groups in a DID model. The conclusion derived from these findings is important for the regulator to realise that the country has been benefited from the quarterly reporting.

Alternative matching methods has been used for robustness check. Table 16 presents results from alternative approach, Abadie and Imbens's (2002, 2006) matching estimator using propensity score (computed using software named STATA version 13), a method that further developed on Cochran and Rubin (1983)'s Mahalanobis Metric Matching method using Mahalanobis distant. For comparison, the analysis results of a simple nearest neighbor matching method using STATA version 11, which matches propensity score at 2 and 5 integers are discussed. The Odds ratio is used since there is no weight considered in this simple propensity score matching. The results obtained from these alternative matching methods are consistent with the results from main analysis of Heckman's DID with PSM. Finally, an alternative treatment effect analysis (see Table 17) using pooled cross-sectional regression for DID measurement (Wooldridge, 2013) shows some consistent results that support the main outcome of Heckman's DID analysis in Table 16 as well.

In a robustness check, following Ball and Shivakumar (2008), the model is extended in assessing the changes in information content around earnings announcements and present mixed results in Table 18 and Table 19. Both tables use the firm-year level of cross-sectional regression model on MA to test on the effects of legal reform to higher reporting frequency on Mandatory adopters, where Table 19 show the sensitivity results of December FYE firms. The Chow test's F-

statistics⁴⁷ are significant for both test, but there is rarely significant window returns noted during the test period other than year 2002, where a paradigm shift of significant market reaction is noted from quarter two and four of six-monthly reporting regime to quarter one and three (strongly significant for quarter three) of quarterly reporting regime. This shift may be due to after the legal reform to IRF, ‘fewer’ shocks occur at the mid-year and year-end reporting dates. In summary, the mixed results of all firm-year cross-sectional regressions on MA and the December-FYE MA firms indicate that there are significant differences in the association of window returns and annual returns between the pre- and post-legal reform periods, which support the expected significant changes in information content and timeliness for MA after the legal reform (hypothesis one and two), but there is no robust shift of information timeliness from the six-monthly announcement dates to the new quarterly earnings announcement dates (quarter one and three).

Furthermore, Table 20 also shows mixed results for the test of crisis effect. The aim of this test is to examine if the crisis has an effect in deteriorating the analysis results as the market is less efficient during the crisis period, where there should a more pronounced effects/differences between the pre- and post-legal reform outside the crisis period than during the crisis period. The Chow test shows significant differences in the regressions results of the crisis and non-crisis period for both pre- and post-legal reform period. However, little evidence documented at a firm-year level significant window returns except for year 2002. Again, the results support the first hypothesis of this study, but ambiguous in supporting the second hypothesis.

⁴⁷ Chow test’s F- statistic is employed to check on the significant difference of pooled regression results between the bi-annual and four-quarter reporting regime.

On the other hand, the results of robustness test on timeliness for two years before and after the legal reform to IRF show significant reduced of abnormal security returns surrounding the mid-year and year-end reporting dates. The finding explains significant decreases in the information gap between informed and uninformed investors via more frequent reporting, and thus, the results support the second hypothesis where after the legal reform to IRF, the information timeliness has been improved because higher disclosures reduce the information asymmetry among traders. This is supported by slightly decrease in magnitudes of daily security returns volatility for the post-crisis (after 2001) period as compare to the pre-crisis period (before 1997 Asian financial crisis), where the return volatility after 2001 may be noise.

Table 14
Summary Structure of Tests and Findings

Analysis	Main Tests & Alternative Tests: Treatment Effect Analyses	Robustness Check	Supportive Findings
(1) Main Analysis	Heckman's model : Difference-in-differences(DID) with Propensity Score matching (PSM) (Refer to Table 15)	<ul style="list-style-type: none"> (1) Comparative matching Technique <ul style="list-style-type: none"> - Matching Estimator (Abadie & Imbens, 2002, 2006) - Mahalanobis Metric matching - The nearest neighbor with PSM (Refer to Table 16) 	The results are consistent to the main analysis
	<ul style="list-style-type: none"> - A two-stage approach - Using PSM Technique - Using Panel data - An event study - Test on the effect of higher financial reporting frequency by comparing the CICT before and after the legal reform, and between two sub-groups. 	<ul style="list-style-type: none"> (2) Alternative DID approach <ul style="list-style-type: none"> - DID with Cross-sectional regression (Wooldridge, 2013) (Refer to Table 17) 	Consistent results to main analysis and alternative matching methods in (1).
		<ul style="list-style-type: none"> Limitations on different methodology <ul style="list-style-type: none"> - Heckman's Correction Model (Selection model) - Using inverse mills ratio, IMR 	Section 5.1.1 & 5.1.2 explain the choice of DID methodology over Selection model. Disclose the limitations of Selection model against PSM and PSM is the solution to it. (Lennox et al., 2012).
Key Findings	The average effect of legal reform on mandatory adopters (ATT) is negative and significant for the tests on sample data of 1360 earnings announcement observations. The findings support hypotheses 1 & 2 on the increased information content and timeliness (CICT) due to higher reporting frequency.		

Analysis	Firm-Year Cross-Sectional Regressions	Robustness Check	Supportive Findings
(2) Robustness Check	Cross-sectional regression model with Artificial Windows Created	<ul style="list-style-type: none"> (1) Firm-year level <ul style="list-style-type: none"> - Firm-year pooled cross-sectional regression on MA - Using panel data - Focus on mandatory adopters only. (Refer to Table 18) 	Consistent results noted & supportive to main analysis. The shift of significance in Window returns is robust.
	<ul style="list-style-type: none"> - A firm-level cross-sectional regression analysis - Using panel data - Test period: 2 years before and after legal reform to higher reporting frequency. - Based on fiscal year for MA and December only firms. - Crisis effect is measured on the calendar year basis. 	<ul style="list-style-type: none"> (2) Sensitivity test on sub-group <ul style="list-style-type: none"> - Test on December financial year end (FYE) group (Refer to Table 19) 	Mixed results shown.
		<ul style="list-style-type: none"> (3) Crisis Effect (Time rolling) <ul style="list-style-type: none"> - A test of crisis effect on 8 calendar years - The test period has been extended to 4 years before and after the legal reform to quarterly reporting. - Based on Calendar year instead of fiscal year (Refer to Table 20) 	There are more pronounced significant effects of legal reform to IRF on CICT in the non-crisis period (after the legal reform to IRF).
Key Findings	There are mixed results. The significance of window returns at quarter 2 and 4 (using original window) have shifted to quarter 1 and 3 after legal reform to IRF. (Benston, 1967; Landsman & Maydew, 2002).		

6.1 Average Treatment Effect on Mandatory Adopters

In this study, there are two reasons to assess the treatment effect of higher reporting frequency on mandatory adopters. First, the government intends to increase the level of corporate transparency via mandatory compliance of quarterly reporting at the firm-level. According to the theory of disclosure regulation (as discussed in Chapter 4, Section 4.3.1 on page 85), mandatory quarterly reporting requirement can be used as a device to force firms to disclose any good or bad news; to curb management from self-benefits incentive or manipulations, forgone profitable investment opportunities or to avoid any assets expropriation; and increase level of corporate governance to attract/ retain foreign investors (Leuz & Wysocki, 2006). Hence, it is important to single out the impact of this legal reform to IRF on firms that are forced or adopt quarterly reporting non-voluntarily(Butler et al., 2007; Fu et al., 2012). The findings have implication for government/ policy makers whether this legal reform fulfills the intention of enhancing shareholders protection via higher reporting frequency.

Second, the mandatory change to reporting frequency is not influenced by firm characteristics. For example, each of the public-listed firms is mandated to report quarterly to the SEC and Public regardless of their sizes. Thus, this requirement mitigates the endogeneity concern on results obtained from analysis (Fu et al., 2012). Moreover, following Heckman's Difference-in-differences model (Heckman, Ichimura, & Todd, 1998) by matching the propensity scores between the mandatory adopters and benchmark group, help to further control for endogeneity and self-selection bias. The DID model can generate results on average treatment effect on treated (the mandatory adopters). Any significant changes to the information content and timeliness at firm level (which is a proxy for corporate transparency) may have implications for

corporate and/ accounting and finance professionals on the usefulness of quarterly reporting, or to regulator/ policy makers that may consider in adopting higher reporting frequency.

The key analysis results of this study are obtained from Heckman's Difference-in-differences model with propensity scores matching (thereafter named DID with PSM), and the supportive results from alternative test are provided by Abadie and Imbens' matching estimator model. In the first DID analysis, mandatory adopters are named as treated group and the mandatory adopters (MA) group is controlled against benchmark (EA) group by setting mandatory adopters as a function of size and agency costs: $MA = f(\text{size}, \text{agency costs})$. (Butler et al., 2007). The results from the robustness tests are obtained from the OLS regression and firm-year cross-sectional regression analysis.

6.1.1 Main Results: Heckman's Difference-in-differences Method with PSM

This Heckman's DID analysis focuses on the average treatment effect on treated (ATT). It tests the significance of the effects of legal reform to higher reporting frequency in changing the information content and timeliness of mandatory adopters (the treated). Table 15 presents the analysis outcome on ATT using Heckman's DID method with propensity scores (Heckman et al., 1997, 1998). Table 16 shows the results⁴⁸ of alternative matching methods based on Abadie and Imbens' (2002, 2006) matching estimator and Mahalanobis metric matching- the '*nmatch*' (Cochran & Rubin, 1973).

Table 15 shows negative and significant of average treatment effects on treated (MA) at the post-legal reform period. There is significant effect of legal reform to IRF on information content and timeliness contributed by MA firms to total information environment. This finding supports the hypotheses (H_1) in this study that the higher reporting frequency results significant changes to the information content and timeliness. After the legal reform to higher reporting frequency, the average treatment effects on treated (ATT) is negative and significant at -3.37, for the bandwidth set by default of 0.8 (ATT is -3.39 for the bandwidth set at 0.6). Both of these results are significant at 5% level of 95% confidence interval. The negative ATT indicates that differences of the changes in information content and timeliness between MA and EA group become smaller in the post-legal reform period than the period before the legal reform to IRF because the early adopters (EA) adopted four-quarterly reporting voluntarily prior to the legal reform to IRF. The standard errors obtained from bootstrapping are at 1.46 for both bandwidth setting. The results of

⁴⁸ Table 15 and 17 shows the results of DID analysis using two different version of STATA software package (Stata version 11 & 13). The provider of STATA package makes a note on the program system that, in the latest version of Stata13, the standard errors has accounted for the estimation of propensity scores.

this study are however in contrast with the findings of Yang (1999). In Yang's (1999) cross-countries study, he reports with no significant effect of higher reporting frequency on return synchronicity among Malaysia listed firms. Nevertheless, the results obtained in this study are consistent with the findings reported by Ku Ismail and Chandler (2003) that indicating a significant relationship exists between timeliness of the quarterly reports and four company's attributes of size, profitability, growth and capital structure in Malaysia (Ku Ismail & Chandler, 2003), but in contrast with Butler et al. (2007) which filed little evidence on mandatory effect of higher reporting frequency on the speed of information.

In the last five columns of Table 15, sensitivity analysis outputs have reported consistent significant results of ATTs between the tests without trimming and with trimming at different levels. Table 15 shows the findings from different trimming specifications of sensitivity analysis, which indicate the sensitivity of legal reform effects for mandatory adopters (MA) to the distribution of propensity scores (Guo & Fraser, 2010). The ATTs are significant at 5% level for trimming level at 1% and 2%, and the significance of ATTs still hold at 10% level for trimming level at 5% and 10%. Since the significance of analysis results after trimming is unchanged, no indication appears of the possible issues in omission of important variables and measurement error in the covariates.

In overall, the key results from Heckman's DID analysis suggest the effectiveness of legal reform to higher reporting frequency on mandatory adopters. The mandatory adopters (MA) of four-quarterly reporting have been significantly affected in their total information environment by the switch to higher reporting frequency. There is no such measure reported using DID-PSM

on the evaluation of effects from the legal reform to higher reporting frequency on information environment before. The above findings support the evidence from previous studies which suggest on informativeness of quarterly reporting (Lands and Maydew, 2002). The findings are also consistent with the studies' findings on interim reporting increases information content over time, by Truong (2012) and Emanuel (1984). The increased reporting frequency (via quarterly reporting) has its role in improving the level of transparency of the less efficient market in the emerging economies (Dogan et al., 2007; Verrecchia, 2001). Thus, the findings support the first and second hypotheses of this study where a higher reporting frequency results in higher information content and timeliness.

Table 15
Difference-in-differences Method with Propensity Score Matching and Sensitivity Tests (Trimming)

Below are the findings for Difference-in-differences (DID) analysis (Heckman et al., 1997, 1998) using: (a) DID (kernel-based matching); and (b) Propensity score with the nearest neighbor matching, a simple matching on nearest propensity scores, for comparison purposes. The kernel-based matching measures ATT based on information from all possible controls within a common support region (Guo & Fraser, 2010). It is a two-stage procedure: (1) compute propensity score from Logistics for matching; (2) run non-parametric regression for matching with kernel function to obtain kernel estimate (the counterfactual). Bandwidth (bw) is set at 0.6 and 0.8 (by default) to capture 60% and 80% (respectively) number of observations falling into the span. Bootstrapping (bs) is used to lead the standard errors and 95% of confidence interval. In the application of kernel estimator to DID analysis, first, I obtained the change of information environment (changes in information content and timeliness, CICT) between two-time-point (i.e. before and after the legal reform to higher reporting frequency). Second, the kernel-based matching method is employed to calculate the kernel estimator (counterfactual, $[Y_{0i} - Y_{0t'} | D=0, P(x)]$) to determine average treatment effect for treated (ATT). This test is performed with assumptions imposed: (i)The outcome for untreated is independent of the treated assignment, $[Y_0] \perp D | X$, (ii) mean independence, $E(Y_0 | D=1, X) = E(Y_1 | D=0, X)$, (iii) Valid in exclusion restriction. I used software program: Stata version 11 with psmatch2 (Leuven & Sianesi, 2003) command. Trimming strategy is used for sensitivity analysis.

$$\text{DID Model: } \text{ATT}_{\text{DID}} = 1/n_1 \sum_{i \in I_1 \cap S_p} [(Y_{1ti} - Y_{0t'i}) - \sum_{j \in I_0 \cap S_p} W(i,j)(Y_{0tj} - Y_{0t'j})]$$

Treatment effects analysis : Heckman's DID approach (Stata 11: psmatch2 Procedure)			Average Treatment Effects on Treated (ATT)		Sensitivity Analysis: Trimming			
Matching Method	Match on	Specification	Matching	Standard	Trimming level at:			
			Coefficient	Errors (bs)	1%	2%	5%	10%
Kernel-based Matching (Heckman et al., 1997,1998)	Propensity Score (by default)	bw (0.8)	-3.371 (t= -2.31)**	1.463	-2.856 (t= -2.04)**	-2.862 (t= -2.04)**	-2.709 (t= -1.92)*	-2.652 (t= -1.87)*
		bw (0.6)	-3.388 (t= -2.31)**	1.489	-2.892 (t= -2.04)**	-2.898 (t= -2.04)**	-2.747 (t= -1.93)*	-2.693 (t= -1.88)*
Number of Firms :		85						
Number of Earnings Announcemnets :		1360						

Note : *, ** are significant at 10% and 5% level respectively, for a two tailed test.

6.1.2 Comparative Matching Methods: Matching Estimator

The Matching Estimator

Table 16 shows significant results of treatment effects analysis for both the k-nearest neighbor matching with propensity scores and Mahalanobis metric matching. These estimated ATTs provide consistent evidence to the findings in Table 15 of Heckman's DID Kernel-based matching and the nearest neighbor matching with propensity scores. The average treatment effects on mandatory adopters of higher reporting frequency (ATTs) are negatively significant at -2.82 (at 5% significant level of 95% confidence interval), for the nearest neighbor matching specification set by default of 5 (n(5)). The ATT is -4.503 significant at 10% if the nearest neighbor matching specification set at 2 (n(2)). These findings lead to a conclusion in this study that higher reporting frequency has significant effects on the total information environment, particularly on the changes of information content and timeliness.

Consequences of different commands used for analyses

If a researcher uses Matching estimator – the ‘*teffect psmatch*’ in Stata v.13 (Abadie & Imbens, 2002,2006), standard error has accounted for the estimation of propensity score. However, this is not the case if the researcher uses ‘*psmatch2*’ (in Stata version 11), which is the same command use for Heckman's DID model in the main analysis of this study. As noted in the seventh column of Table 16, the matching estimator with propensity scores matching (Abadie & Imbens, 2002, 2006) generates a larger standard errors ($SE=2.579$) for two-nearest neighbor matching (n(2)) than the Nearest neighbor matching with propensity scores using ‘*psmatch2*’ of Stata version11 ($SE= 1.786,$) (as shown in the last column of Table 16). The different results in standard error of n(2) may be due to the underlying assumptions of each treatment effects methods.

Table 16
Treatment Effect Analysis: A Comparison of ATTs Estimation using Different Matching Methods

Below are the findings acquired from two different types of treatment effect analysis other than Heckman et al's Kernel-based matching method: (1) Matching estimator, k-nearest neighbor (Abadie & Imbens, 2002, 2006); and (b) the nearest neighbor matching with Mahalanobis Metric, a conventional way of matching, for comparison purposes. The k-nearest neighbor (Abadie & Imbens, 2002, 2006) is a combine of the two methods of Mahalanobis metric matching and propensity score. I used software program: *Stata version 13* with *teffects psmatch* and *teffects nnmatch* commands. The nearest neighbor matching are performed 2 and 5 nearest (i.e. n(2) and n(5) or nn(2) and nn(5)) only due to a small sample size obtained. The last two columns of ATTs are from Table 1's the nearest neighbor matching on propensity scores (using *psmatch2* procedure in Stata 11) for comparison purposes. AI in the 6th column denotes Abadie and Imbens.

Treatment effects analysis (STATA 13: teffects procedure)			Average Treatment Effects on Treated (ATT) (I)			ATT- simple nearest neighbor (Stata 11: psmatch2 Procedure) (II)	
Matching Method	Match on	Stata Command	Matching Specification	AI Robust Coefficient	Standard Errors	AI Robust Coefficient	Standard Errors
(a) k-nearest neighbor (n) (Abadie & Imbens, 2002,2006)	Propensity Score & the nearest neighbor	teffects psmatch	(by default)	n (5)	-2.816 (z= -2.08)**	1.354	-2.816 (t= -2.01)**
				n (2)	-4.503 (z= -1.75)*	2.579	-4.503 (t= -2.52)**
(b) Mahalanobis Metric Matching (Cochran & Rubin, 1973)	Mahalanobis Distance & the nearest neighbor	teffects nnmatch	(by default)	nn (5)	-2.816 (z= -1.68)*	1.676	
				nn (2)	-4.304 (z= -1.93)*	2.235	
Number of Firms :	85						
Number of Earnings Announcemnets :	1360						

Note : *, ** are significant at 10% and 5% level respectively, for a two tailed test.

6.1.3 Alternative DID Approach: Cross-sectional Regression

Table 17 presents results from treatment effect analysis using cross-sectional regression for the DID. Two sets of results are reported. Column (1) of Table 17 shows the regression results for the dependent variable, changes in information content and timeliness (thereafter named CICT). δ_1 is the measure of Difference-in-differences on treated. The results show that the changes in content and timeliness for mandatory adopters at the post-legal reform period (δ_1) are significant but negative, -2.82 at 5% significant level. However, there is no significant relation between CICT and POST or MA. The negative results suggest that the differences of changes in information content and timeliness (CICT) for MA when compared to EA have been smaller for mandatory adopters at the post-legal reform period. This finding of negative coefficient is consistent with the results provided by main analysis in Heckman's DID model (refer to Table 15). In fact, the negative coefficient (δ_1), -2.82 at 5% significant level (in Table 16) is similar to the analysis outcome of Abadie and Imbens' matching estimator and Mahalanobis Metric Matching (Cochran & Rubin 1973) for 5 nearest neighbor (n(5) and nn(5) respectively, both are set by default).

$$\text{CICT} = \beta_0 + \delta_0 \text{ POST} + \beta_1 \text{ MA} + \delta_1 \text{ POST}^* \text{ MA} + e_1$$

Where,

POST=1 after the legal reform, zero otherwise.

MA refers to treated group, Mandatory adopters equal 1, zero for benchmark group.

POST*MA is the interaction term to capture the relation between annual return and with window return of mandatory adopters at post-legal reform period.

In summary, the DID analyses support the hypotheses (H₁) and (H₂) where the net effects from higher reporting frequency results in higher information content and timeliness. In this study, the significant findings of average treatment effect on treated group (ATT) implying that mandatory adoption of quarterly reports has significantly increased the CICT of MA group. Supported by the results from robustness check, the results of significant effects from legal reform to IRF on treated suggest that, the regulatory effects have been significantly changing the firm-level of transparency. These results eventually move the equity prices of listed firms, particularly to those firms that are mandated in adopting quarterly reporting, and thus, improved the market efficiency.

Table 17
Difference-in-differences Model – Results with Cross Sectional Regression

This table presents the results from the treatment effect analysis using cross-sectional regression for the Difference-in-differences (Wooldridge, 2002). The dependent variable is changes in information content and timeliness (thereafter named CICT). The table shows the regression results of CICT, where δ_1 is the measure of Difference-in-differences on treated.

$$CICT = \beta_0 + \delta_0 POST + \beta_1 MA + \delta_1 POST * MA + e_1$$

Where, POST=1 after the legal reform, zero otherwise. MA refers to treated group, Mandatory adopters equal 1, zero for benchmark group. POST*MA is the interaction term to capture the relation falls between annual return, legal reform and mandatory group. The test period covers from 1 February 1996 to 31 December 2002.

Difference-in-differences Model (Wooldridge, 2013)

Variable	Predicted Sign	CICT Coefficient	(t-statistics)
POST	+	1.9047	1.49
MA	+	1.4949	1.61
MA* POST	-	-2.8162	-2.14**
Constant		-0.4798	-0.53
Adjusted R ²			2.13
Observations			340
No. of firms			85

Note: ** significant at 5% level.

6.2 Robustness Tests

6.2.1 Effect of IRF on Mandatory Adopters - Regression Model

Table 18 (on page 172) presents the results of the firm-year and pooled cross-sectional regressions on 436 observations with control on heteroscedasticity. The artificial windows are used in the pre-legal reform period (^1997 and ^1998) to allow like-with-like comparison to the post-legal reform period. Chow test is employed to examine the significant difference of window coefficients from the pooled cross-section regression between the pre-legal reform and post-legal reform period.

Table 18 shows that there is significant effect of legal reform to IRF on the changes of information content and timeliness of MA in the post-legal reform period. Chow test's F-statistic is 2.49, significant at 5% level. This finding supports the significant results in the main analysis of Heckman's DID (in Table 15). This could be explained by higher reporting frequency that may increase the information content and timeliness (H_1), and improve information timeliness (H_2) due to reduced information gap between informed and uninformed investors. Therefore, the early arrival of news via higher reporting frequency has resulted lower information asymmetry among investors (Fu, Kraft & Zhang, 2012).

Prior to legal reform to IRF, Table 18 shows significant investors response to news in all real EADs in 1998. Differently, the coefficients for artificial window 2 and 3 in 1998 and the pooled regression results are strongly significant at 1% level. None of the windows is significant in FYE 1997. The negative coefficients between annual returns and window returns in the second and third quarter of 1997 may be due to the Asian financial crisis during mid-1997 to early 1998. It

was the “deep-in-crisis” period where investors are more careful and sensitive in making investment decisions.

In 1998, the significant return of artificial window 3 is unexpected. The return is expected to be normal (random) at any 3-day window on any date selected before a six-monthly earnings announcement and reporting date. Unlike the expected significant responses from investors at quarter two (Window 2), the highly significant of artificial window 3 (significant at 1 % level) in 1998 can be explained by high uncertainty during the crisis period, and investor may be react to any news after the ‘panic period’ of mid-1998. From other perspective, it could also be explained as the investors and financial analysts trade more often after the 9th months and before the financial year end of business operation, regardless whether there is an earnings announcement or financial report released to public during that period of time. If this is the case, higher reporting frequency has in fact helped to release more cumulative and genuine financial information of listed firms to less informed investors. Eventually, this may reduce the information gap between informed and uninformed traders, improve the information asymmetry, and thereby increase market efficiency.

In the post-legal reform period, in 2002, the significant of investor responses shifted from Window 2 and 4 (for original window in 1998) to Window 1 and 3, at 10% and 1% level respectively. However, if this is only noted in year 2002, it could be an anomaly. Hence, the results in 2002 cannot be substantiated to the other years. Conceptually, during this non-financial crisis period, general investors react to earnings announcement and financial report at the first-quarter probably because the first quarter report allow comparison of actual operation

performance to budget. The third-quarter report provides cumulative and real number of business performance that help to improve the investors' decision making. All the window returns in 2001 are not significant. In 2001, the negative coefficient of quarter three (window 3 at -0.11) reflects on investors' reaction towards the global financial crisis (mainly the influential from the United States) and not the earnings announcement effect. Even though the adjusted R-square of each firm-year regressions is low, in this robustness check, the focus is on the economic consequences of change in association between annual return and window returns at a firm-year basis.

In summary, there are mixed results reported in this study. The legal reform to higher reporting frequency has significant effect on investor behaviour, equity prices and market efficiency that support hypothesis one and two. However, only in year 2002, the significance of window returns has shifted from the existing quarter two and four (window of 2 and 4) under bi-annual reporting regime to quarter one and three (window 1 and 3) under four-quarterly reporting regime, which may indicate better information content and timeliness surrounding quarter one and three (window 1 and 3). This one year result is not sufficient to support the second hypothesis for improved information timeliness.

Table 18
Robustness Test: Firm-year Cross-Sectional Regression for Mandatory Adopters (MA)

This table presents estimates for MA from the firm-year pooled regression and yearly regression of annual buy-and hold returns (BHRs) on the bi-annual and four quarterly earnings-announcement BH returns of firms over period from 1 February 1996 to 31 December 2002. The regression analysis uses original window and artificial window (^) for like-with-like comparisons. The tests have been carried out for two fiscal years before and after the legal reform in 1999. The bi-annual and quarterly BHRs are computed from daily prices, extracted from Datastream database. Earnings Announcement returns are buy-and-hold return for the three days surrounding the earnings-announcement date for periodic reporting from SIRCA database. These regressions are run with control on heteroscedasticity.

$$R_i(\text{Annual}) = a + b_1 R_i(\text{Window 1}) + b_2 R_i(\text{Window 2}) + b_3 R_i(\text{Window 3}) + b_4 R_i(\text{Window 4}) + e$$

Sample Data with Artificial Window

Year	Intercept					No. of Obs.	Adjusted	
		Window 1	Window 2	Window 3	Window 4		R ² %	R ² %
Original Window								
1997	-0.010		-0.050		0.080	109	0.51	0.01
1998	-0.098*		1.870***		1.054**	109	13.69	12.07
Pooled	-0.035		1.196***		0.537*	218	7.79	6.93
Artificial Window								
^1997	-0.012	0.232	-0.038	-0.092	0.072	109	1.60	-2.18
^1998	-0.215***	-0.257	1.383***	3.198***	0.243	109	33.40	30.79
Pooled	-0.054	-0.058	1.027**	1.709**	0.146	218	17.70	16.10
2001	0.004	0.048	0.193	-0.112	0.180	109	9.20	5.69
2002	0.047	1.739*	0.944	1.280***	0.458	109	12.40	9.01
Pooled	0.015	0.590*	0.255	0.686***	0.294	218	5.55	3.78
Chow Test-F Statistic:		2.49** (p=0.031)						
Obs.		436						

*, ** and *** indicate the significant level below 0.10, 0.05 and 0.01 respectively.

Note: ^ is an indication of artificial window applied in the regression analysis. The highlighted year of ^1997 and ^1998 present estimates from the annual regression of yearly BHR on quarterly announcement window BHRs (four windows), in which the announcement window BHRs for window 1 and window 3 for year ^1997 and ^1998 are computed based on the earning announcement date of window 1 and window 3 for year 2001 and 2002 at post-reforms period, respectively. Window 2 and window 4 of year ^1997 and ^1998 are based on the genuine semi-annual announcement window BHRs at per-reforms period.

Table 19**Robustness Test 2: Sensitivity Analysis on MA-December Year End (FYE) Firms**

This table presents estimates for MA-December FYE firms from the firm-year regression of annual buy-and hold returns (BHRs) on the bi-annual and four quarterly earnings-announcement BH returns of firms over period from 1 February 1996 to 31 December 2002. The regression analysis in uses artificial window (^). The tests have been carried out for two fiscal years before and after the legal reform in 1999. The bi-annual and quarterly BHRs are computed from daily prices, extracted from Datastream database. Earnings Announcement returns are buy-and-hold return for the three days surrounding the earnings-announcement date for periodic reporting from SIRCA database. These regressions are run with control on heteroscedasticity.

$$R_i(\text{Annual}) = a + b_1 R_i(\text{Window1}) + b_2 R_i(\text{Window2}) + b_3 R_i(\text{Window3}) + b_4 R_i(\text{Window4}) + e$$

Sample Data with Artificial Windows**- Mandatory Adopters**

Year	Intercept	Window 1	Window 2	Window 3	Window 4	No. of Obs.	Adjusted R ² %	Adjusted R ² %
Original Window								
1997	-0.013		-0.130		0.125	67	1.42	-1.57
1998	0.304**		0.902		-0.008	67	5.64	2.78
Artificial Window								
^1997	-0.014	0.381	-0.041	-0.126	0.084	67	2.49	-3.81
^1998	0.296***	0.645	0.891*	0.294	-0.122	67	6.85	0.85
2001	0.007	0.012	0.305**	-0.219	0.286*	67	14.65	9.15
2002	-0.036	0.675	2.404**	1.866***	1.080	67	25.33	20.51
Chow Test-F Statistic:								
Obs.	268							

*, **and *** indicate the significant level below 0.10, 0.05 and 0.01 respectively.

Note: ^ is an indication of artificial window applied in the regression analysis. The highlighted year of ^1997 and ^1998 present estimates from the annual regression of yearly BHR on quarterly announcement window BHRs (four windows), in which the announcement window BHRs for window 1 and window 3 for year ^1997 and ^1998 are computed based on the earning announcement date of window 1 and window 3 for year 2001 and 2002 at post-reforms period, respectively. Window 2 and window 4 of year ^1997 and ^1998 are based on the genuine semi-annual announcement window BHRs at per-reforms period.

6.2.2 December FYE Firms – Regression Model

Table 19 shows mixed results of the effect of legal reform to IRF on MA-December financial year end (FYE) firms. The sample set covers 62% MA-December FYE firms (refer to Appendix 7). The Chow test shows significant F-statistic for the significant changes in the association of window return to annual returns between the pre- and post-legal reform period. However, generally, Table 19 shows that there is rarely significant window returns noticed at each firm-year level during the pre-legal reform period, except for year 2002. This may be explained by the sample data and time of the year that is selected as test period where there was high uncertainty due to the financial crisis. However, after the legal reform to IRF, these December FYE firms show significant window returns for window 2 and 4 in year 2001 even during the crisis period. This may indicate that investors are still in the transition period to learn and be aware of the usefulness of quarterly reporting. In year 2002, even though the cross-sectional regression results present significant window returns at quarter two and three (window 2 and 3), no significant result noted for window 1. Hence, there are mixed findings for the effect of legal reform to IRF on mandatory adopters for December FYE firms.

6.2.3 Crisis Effect – Regression Model

Table 20 presents the results of possible crisis effect on the changes in information environment for MA firms after the legal reform to IRF. The analysis is set at calendar year basis and the sample data covers 1156 observations for 8 years.

In Table 20, the results in year 2002 may indicate that the effect of legal reform is more pronounced outside crisis period than the period during crisis period (year 2000-2001), (Mensi, 2012). Chow test shows significant F-statistic for the comparison between crisis- and non-crisis periods for both reporting regimes. This is consistent with Mensi (2012)'s study on the market efficiency of 26 emerging stock markets that documents a negative relationship between financial crisis and market efficiency. The market is less efficient during the crisis period in reflecting the firm-specific information into firm value (Gupta, Krishnamurti and Alireza, 2011, a study of developed market).

The unfavorable results in year 2003 could be explained by a lower performance of Malaysia equity market than 2002 due to the economy slowdown in early 2003. The first half of 2003's real GDP growth is 4.5% (actual GDP for 2003: 5.2%). This slowdown in economy in 2003 may be caused by a combined factors, such as the continue effect of global economy slowdown in 2001; the Iraq War and the SARS outbreak in 2003, which have also impact on the private domestic demand. This has weakened the capital accounts and contributed a deficit of US\$2.75 billion (approximately), as compared to US\$2.5 billion (approximately) in the second half of 2002. The overall private consumption has decreased and the service sector has also weakened. (International Monetary Fund, 2004). Further, there is concern on the increased unemployment rate to 4 percent due to skills shortages and mismatches. (International Monetary Fund, 2004). Firms have been accelerating their activities in capital investment like technological capabilities upgrading, where the growth in capital investment is stronger (2003: 2.7% and 2002: 0.3%) as it has potential direct impact on production output. (Bank Negara Malaysia, 2003). Other factors that possibly explains the lower equity market performance in 2003 is the construction industry's

lower growth rate at 1.9% in 2003 (2002: 2.3%). This is due to the completion of major privatization projects by some construction companies in 2003 (Abdullah, Chai, Anuar & Tan, 2004). Hence, the equity market performance fluctuation could be due to economy uncertainty during the first half of 2003 that influence the investors' decision throughout the year of 2003. Since the clearest result for firm-year regression outside the crisis period occurs in 2002 and ambiguous for 2003, a sharper comparison of results during the crisis versus outside the crisis period can be further explored in future research.

Table 20
Crisis Effect on MA Firms: Cross-Sectional Regression on Calendar Year basis

This table presents estimates from the firm-year regression of annual buy-and hold returns (BHRs) on the bi-annual and four quarterly earnings-announcement BH returns of firms over period from 1 January 1995 to 31 December 2003. The regression analysis uses original window only. The tests have been carried out for four calendar years before and after the legal reform in 1999. The bi-annual and quarterly BHRs are computed from daily prices, extracted from Datastream database. Earnings Announcement returns are buy-and-hold return for the three days surrounding the earnings-announcement date for periodic reporting from SIRCA database. These regressions are run with control on heteroscedasticity. The grey highlighted areas are the financial crisis period (1997-2001).

$$R_i(\text{Annual}) = a + b_1 R_i(\text{Window 1}) + b_2 R_i(\text{Window 2}) + b_3 R_i(\text{Window 3}) + b_4 R_i(\text{Window 4}) + e$$

Sample Data without Artificial Windows

Mandatory Adopters

Year	Intercept	Window 1	Window 2	Window 3	Window 4	No. of Obs.	Adjusted R ² %	Adjusted R ² %
Pre-legal reform								
1995	0.054		1.633**		-0.824	128	4.91	3.39
1996	0.491***		0.601		0.987	128	0.92	-0.66
1997	-0.680***		0.199		0.039	150	1.36	0.01
1998	0.366***		0.150		0.134	150	0.27	-1.08
Post-Legal Reform								
2000	-0.237***	0.974*	1.146**	0.338	0.734**	150	6.63	4.06
2001	0.057**	0.600	0.231	0.005	0.07	150	1.75	-0.96
2002	-0.085***	1.403*	-0.479**	1.149**	1.048*	128	11.94	9.07
2003	0.360***	0.031	0.311	1.106	0.235	128	1.19	-2.03
Chow Test- F Statistic:			Pre-legal reform	11.63***	(p<0.0001)			
			Post-legal reform	10.75***	(p<0.0001)			
Obs./period	556							

Note: *, ** and* *** indicate the significant level below 0.10, 0.05 and 0.01 respectively.

6.2.4 Information Gap and Timeliness

Information Gap

This section discusses on short term information timeliness. Graph in Figure 11 exhibits trend of ACARs for mandatory adopters (MA), the area covers with straight lines are the differences representing information gap. The graph suggests significant decreases in abnormal returns surrounding EADs (ACAR) of MA group, using event window (-45,+2) for two years before and two years after the effective date of the legal reform to IRF. This is consistent with the findings in Table 18 (on page 172).

Since four instead of two reports being released under four-quarterly reporting regime, the magnitude of earnings surprises around earnings announcement dates for quarter two and four has fallen. This has provided strong support to the findings presented in Table 18 (on page 172), where quarter two and four lost their significant to quarter one and quarter two after legal reform to IRF. This also suggests that, after the legal reform to IRF, there are fewer surprises around EADs in quarter two and four due to more information available to investors with higher reporting frequency.

Further, this graph shows decreasing trend of ACARs, the gaps become smaller towards the earnings announcement date (day ‘0’), particularly 10 days before EAD. This is consistent with Heflin et al.’s findings, where a lower abnormal return indicates smaller information gap in the post-legal reform period, which improves market efficiency. (Heflin et al., 2003). In the post-legal reform period, previously uninformed investors will obtain more information than in the period before the legal reform to IRF. Hence, the information gap between the informed and

uninformed traders has been reduced after the mandatory changes to reporting frequency. The influence of timely news on investors' investment decisions may update equity prices more rapidly, and thereby improve market efficiency.

Next, Figure 12 presents the trends of ACARs for mandatory adopters (MA) relative to early adopters (EA) using event window (-60,+2). From -45 days to day '0', the plotted line of ACARs for MA at the post- legal reform period has reduced significantly to below 0.02 ACAR and become consistent to ACARs of early adopters (the benchmark group). The early adopters have been practicing quarterly reporting voluntarily before legal reform to IRF. This support the negative coefficient of ATT in the main DID analysis (in Table 15 on page 162). Lastly, the sharp decline of ACAR of EA at (-60, -46) reflects on investors' response to news from previous EAD around day -60. However, there is absence of high peak for MA during this time of (-60, -46) in 2000 and 2001(crisis period). The peak for EA during this same period of time of (-60, -46) may probably be explained by the post-earnings announcement drift from the previous earnings announcement.

In conclusion, legal reform to IRF has reduced the information gap and improved information asymmetry and market efficiency. The results indicate significant changes in ACARs of MA and the trend of MA is getting closer to EA after the legal reform to higher reporting frequency. Overall, the results support the hypothesis (H_2) that after the legal reform to IRF, the information timeliness has been improved.

Figure 11: Information Gap for Mandatory Adopters (MA)

This graph shows the trends of ACAR for Mandatory Adopters (MA) at event window (-45, +2). The test period covers two years before and after the legal reform to higher reporting frequency. ACAR is absolute cumulative abnormal return, can be computed by using formula: $ACAR_{i,x} = |\prod_{t=-x}^{+2} (1 + AR_{i,t}) - 1|$. The information gap is the area covers with black straight lines.

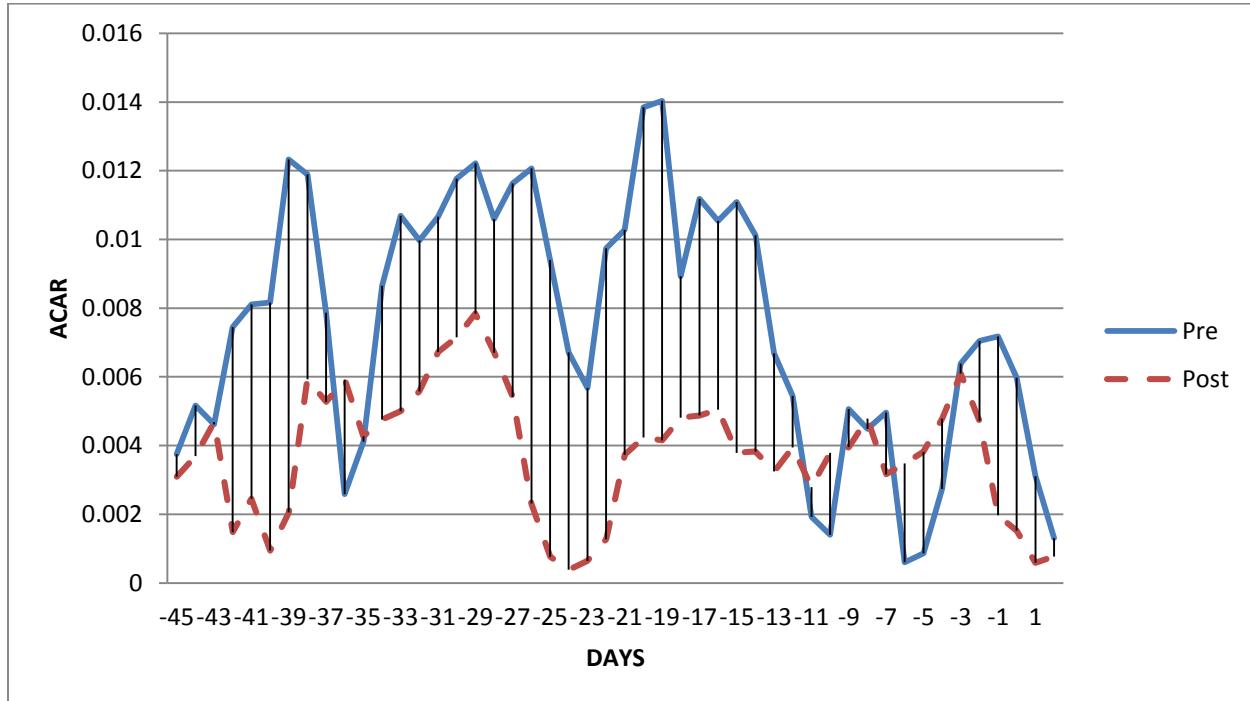
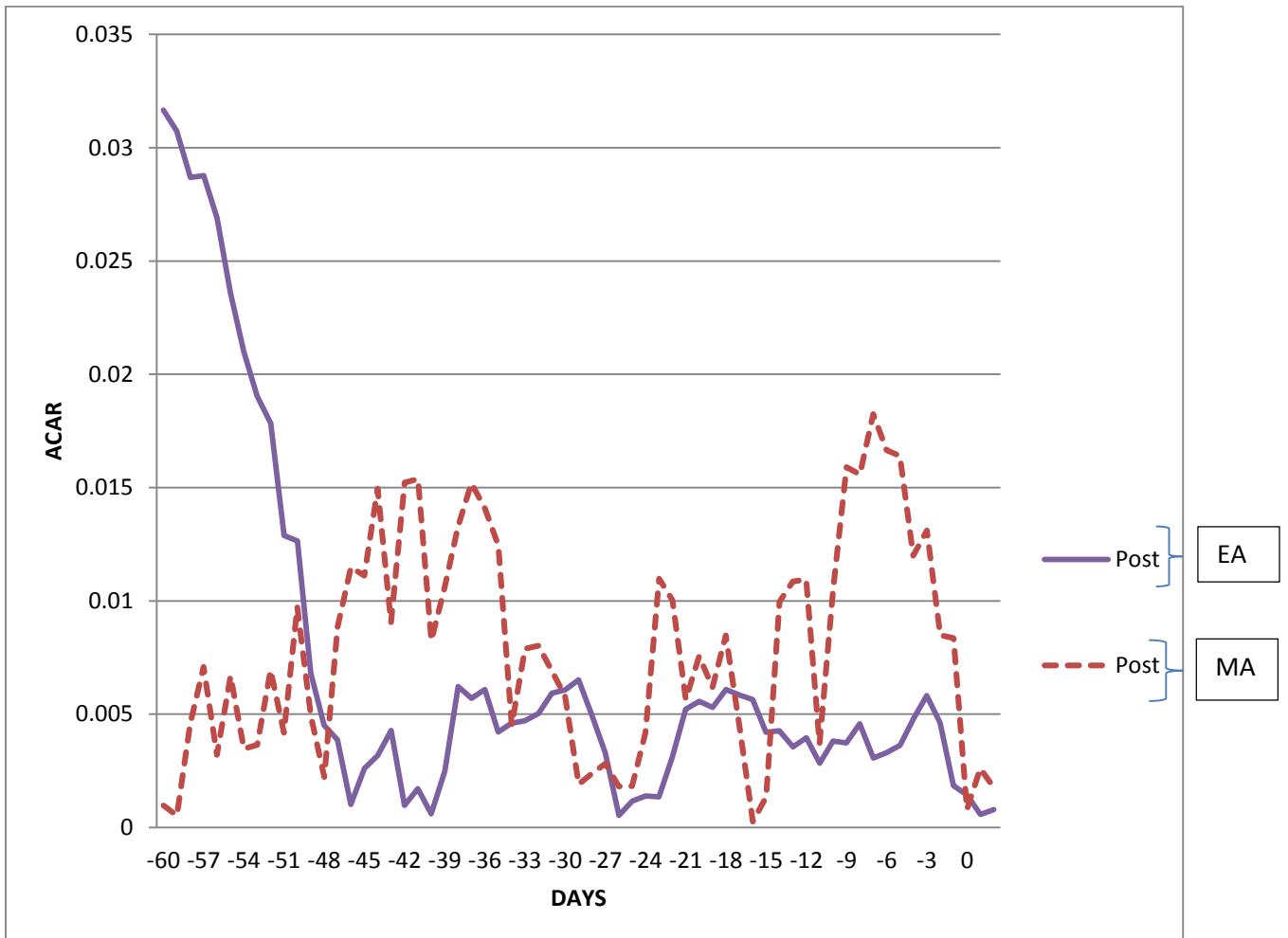


Figure 12: Information Gap for Mandatory Adopters (MA) and Early Adopters (EA)

This graph shows the trends of ACAR for both Mandatory Adopters (MA) and Early Adopters for event window (-60, +2). The test period covers two years before and after the legal reform to higher reporting frequency. ACAR is absolute cumulative abnormal return, can be computed by using formula: $ACAR_{i,x} = |\prod_{t=x}^{+2} (1+AR_{i,t}) - 1|$. The information gap is the area covers with black straight lines.



6.2.5 Effect on Return Volatility

This section discusses on the effect of legal reform to IRF on return volatility. Figure 13 presents a graph demonstrating the changing trend of return volatility over time. The average changes in index return (individual firm prices relative to the market return) is plot over period of 1996 to 2004.

Graph in Figure 13 shows high return volatility from July 1997 until the end of 2001. This reflects on high uncertainty of price performance during the financial crises period. After the crises period, the magnitude of return volatility falls. This can be explained by the recoveries of economy from year 2002 onwards.

Further, if the return volatility trend for non-crisis period is compared before the legal reform to IRF (from January 1996 to June, 1997) to the trend from year 2002 onwards, the former has higher magnitude of return volatility over time. The changes in daily index returns volatility become less consistent in volatility after year 2001 and mostly are noises.

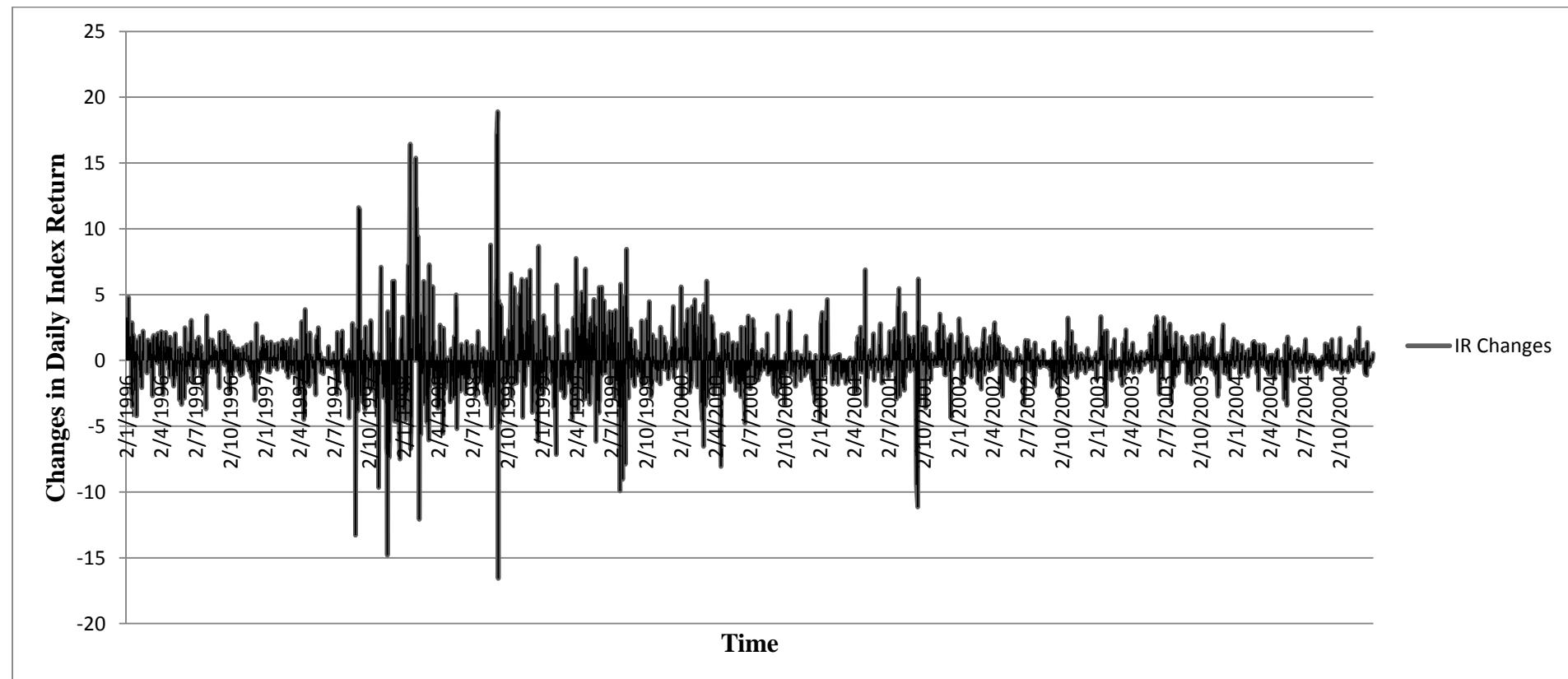
One of the reasons could be due to the global effects of the ‘great moderation’ (BNM, 2010). Even though this reduction in volatility of business cycle fluctuations started from mid-1980s in the United States, where the global inflation average fell from 15.4% during 1990s to 3.9% during 2000s to 2008, Malaysia was moderated to a lower imported inflation and below average domestic inflation. Malaysia’s average domestic inflation was as low as 1.5% within 2000-2004, relative to 2.9% long term average over 50 years (from 1960-2010). The historical low inflation has been caused by global economic institutional and structural changes, advances in computer technology and communication, and other changes in business practices. However, in Malaysia, the average inflation rises from 2005 and reaching

a peak of 8.5% in 2008 due to the inflation of global commodity and food prices during that period of time. (BNM, 2010). Thus, the global effect of low inflation may explain the findings of a lower level of index return volatility (as shown in Figure 13) after 2001.

However, though, in 2002, these findings of lower level of index return volatility than 1990s may also be explained by the narrowing information gap among traders due to higher reporting frequency. A lower level of index return volatility may also be caused by fewer shocks in financial market due to a better market transparency and efficiency, or investors become less different in opinion with lower information asymmetry, which support the hypothesis two (H_2) of the study which hypothesizes that four-quarterly reports improve information timeliness with higher reporting frequency.

Figure 13: Changes in Daily Index Return for period 1996 – 2004

This figure presents the changes in daily index return over period from year 1996 to 2004. The return of individual equity has been compared against market (index) return of Kuala Lumpur Composite Index (currently known as FTSE Bursa Malaysia) to arrive to individual index return. The daily index return capture all the dividend and distributions that are reinvested, which are more accurate results than ignoring them.



6.3 Summary

Based on the discussion of findings, the main results obtained from DID models, treatment effect analyses with propensity score matching conclude that there are significant effects of higher reporting frequency on the equity prices and investor behaviour due to higher level of corporate transparency. Thus, hypotheses one and two in this study have been fulfilled. However, the mixed results obtained from the robustness check of firm-year pooled cross-sectional regressions can be further explored in future.

The results from Heckman's DID analysis (refer to Table 15) suggest that the average treatment effect on mandatory adopters (ATT) is negatively significant after switching from bi-annual to quarterly reporting regime. The negative figure of changes in information content and timeliness signify that the information environment of mandatory adopters (MA) is closer to early (voluntary) adopters in the post-legal reform period. Further, the alternative matching methods of Abadie and Imbens (2002, 2006) and Mahalanobis metric distant provide supportive evidence to the results from Heckman's model. The finding from the alternative DID approach with cross-sectional regression (Wooldridge, 2013) is also consistent with the findings from all treatment effects analysis with significant interaction term (POST* MA) at 5% level.

Next, the robustness tests of firm-year cross-sectional regressions on MA demonstrates the effect of legal reform to IRF in shifting the significant of abnormal returns from quarter two and four to quarter one and three, both significant at 10% and 5% respectively, but only in one year (year 2002). This may indicate a paradigm shift of investor behaviour. From the other perspective, four-quarter reports may fulfill the needs of investors and financial analysts in their actual-budget firm's performance assessments and help them in some key investment

decisions making during the last quarter of the financial year. The Chow test provided significant results for the differences of association of window returns and annual returns between pre-legal reform period and post-legal reform period. However, there is no sufficient evidence noted for the shift of significant of window returns around the EADs. Consequently, the information gap between informed and uninformed investors has been reduced due to timelier arrival of news. Thus, the findings of increased CICT for mandatory adopters (MA) firms after the legal reform to IRF are consistent with the significant results from the main analysis, except for the MA-December FYE firms that report on mixed results. The crisis effect analysis also show mixed results, even where there is more pronounced results noted on the effect of higher reporting frequency outside the crisis period, particularly after the post-legal reform to IRF.

In conclusion, the effects of legal reform to IRF are significant in the post legal reform period. The changes of information content and timeliness for mandatory adopters have been significant after the legal reform to IRF. Hence, the mandatory change to quarterly reporting in emerging economy has improved the information environment of financial market. The findings have supported two of the hypotheses in this study, where the higher reporting frequency results in higher information content and timeliness, and the four-quarterly reports have higher information timelines than the bi-annual reports with lower abnormal return at the post-legal reform period. The improvement in information environment change the investor behaviour, reduced information gap and the movement of equity prices to reflect the timelier information content available in the new financial reporting regime, improves the market efficiency.

CHAPTER 7 Conclusions, Limitations and Future Research

7.0 Conclusions, Limitations and Future Research

7.1 Conclusions

7.2 Limitations and Future Research

7.0 Conclusions, Limitations and Future Research

7.1 Conclusions

This section summarizes the whole thesis. The overview of discussions covers the aim of the study, the motivation behind this research, the changes to policy, the literature gap identified, the contributions, theoretical framework applied, the research design on the methodologies, data and test period. The findings of this study are separately discussed for the effect of legal reform to higher reporting frequency on changes to market efficiency, information content and timeliness before arriving at conclusions.

The aim of this study is to examine the effectiveness of legal reform to higher reporting frequency on the firm level of transparency and market efficiency. In specific term, the study assesses the effect of legal reform to higher reporting frequency (thereafter named IRF) on equity prices and market behaviour. Due to timelier arrival of information after the legal reform to IRF, the increased information content and information timeliness may change the investor behaviour. Normally, investors become more confident to trade under a better information environment with an improved level of corporate transparency. Their responses to news may move equity prices. Hence, when equity prices reflect new information available more rapidly, this may change market efficiency. This study tests the effect of IRF on a group of mandatory adopters of quarterly reporting regime in an emerging economy, Malaysia.

There are three motivations identified on this study. (1) Usefulness of research in financial reporting and disclosure regulations; (2) new results of the effects of higher reporting frequency for emerging economies relative to developed economies; (3) literature gaps identified, in term of the usage of the Heckman's DID (treatment effect) analysis, in the area of Accounting and Finance for further study.

Over the last decade, several studies have been conducted on financial reporting and disclosure regulations around the world that identify the effects of legal reforms to financial governance and reporting for better improvement to the financial system of the economies. Particularly, Asian economies have found to cope reasonably well through the financial shocks of 2007/2008 with greater foreign exchange reserves and more flexible monetary policies than a decade ago (Mayes and Morgan, 2012). The current improved reporting and financing systems are probably an effect of good lesson from their previous experience in 1997/1998 Asian financial crisis. Even though some of the economies, like some of the emerging European economies, are still under recovery from 2007 financial crisis, they may consider to legally reform gradually in their financial system should they have intention of balancing the use of bond markets with financial markets. Thus, it could be interesting to investigate on how the global financial crisis and observed corporate governance deficiencies may lead to SEC legal reforms and require higher disclosure requirements (Leuz & Wysocki, 2008). This study has chosen to test one of the corporate governance initiative legal reforms that is higher frequency of periodic financial reporting in emerging market of Malaysia, which aims to improve the level of corporate governance after the 1997/98 Asian financial Crisis. This policy of four-quarterly financial reports requires public listed firms to file interim reports within two months after the balance sheet date of each quarter based on the fiscal year basis.

Even though there are numerous studies that discuss disclosure regulation changes and the effect of higher reporting frequency, these studies are mainly focusing on developed economies. Even though there are a few studies on emerging economies report on effect of annual and bi-annual reports to date, only Malaysia has been studied on the effect of four-

quarterly reporting among the emerging economies, probably because the Malaysia government is the first to announce the mandatory adoption of quarterly reporting among Asian economies after 1997/98 Asian Financial Crisis.

However, the findings in developed economies may not be generalized to developed economies and are subject to the differences in characteristics at institutional level and firm level of emerging economy and developed economy (Alford et al., 1993; Collins & Kothari, 1989; Healy & Palepu, 2001). Hence, knowing that higher reporting frequency improves timeliness and relevancy of news that can move equity prices (Beaver, 1968), increases the information content (Truong, 2012) and increases timeliness (Ball & Brown, 1968; Butler et al., 2007) to specific group of firms, reduces the information gap between informed and uninformed traders (Bailey et al., 2003; Heflin et al., 2003), thereby lowering information asymmetry (Fu et al., 2012) and improves market efficiency (Heflin et al., 2003) in developed economies, what would be the analysis outcome if we apply the developed countries model to emerging economy?

Literature gap

Despite studies that evaluate usefulness of financial report in emerging economies, some of the evidence found are mainly focus on annual and bi-annual reporting regime (Dogan, Coskun, & Celik, 2007; Haw, Qi, & Wu, 2000; Leventis & Weetman, 2004; Owusu-Ansah, 2000). There are, however, a few domestic studies that report on the timeliness and reliability of quarterly reports in Malaysia (Ku Ismail & Chandler, 2003, 2005, 2005b), but in different approaches of assessing the effect of legal reform to IRF.

Different from studies by Ku Ismail and Chandler (2003, 2005 & 2005b), which measure timeliness by counting the number of days reduced in report submission, this study measures the effect of the legal reform to IRF on investor behaviour that change the market efficiency with changes to information content and timeliness. The Difference-in-differences analysis with propensity scores matching employed in this study is a contribution to the research method in policy analysis in the area of accounting and finance, including the use of an artificial window. The artificial window is created for comparing of like-with-like, which also helps to capture the unobserved event under normal circumstances. The findings of this study may have contribution to the literature of market efficiency.

The disclosure legal reform addressed in this study is a corporate governance initiative reform to enhance the level of corporate transparency via higher reporting frequency. The test period is started from financial year 1997-1998, covers the period of 1997 Asian financial crisis, where the Asian economies, particularly those with weaker corporate governance level were severely affected. Malaysia is one of the affected economies and also the first to switch from a bi-annual to a quarterly reporting regime. Hence, the findings in this study can be generalized to an economy that is characterized by a similar ownership structure concentration and a small-medium firm concentrated economy, which could be of interest to a government that has the intention of mitigating foreign investor risk, to the regulator/ policy maker that is involved in financial disclosure or corporate governance policies making.

Contributions

The contributions to the literature are important, where this study provides new evidence in the study of emerging markets. This study also documented new evidence contributing to the literature on financial disclosure and the information environment. The effectiveness of

mandatory quarterly reporting regime in improving corporate transparency, information environment and equity market efficiency could be supportive of current existing literature. Second, even though DID analysis have been popular in accounting literature, few studies noted using the same Heckman's DID methodology with PSM in quantifying the effect of changes to disclosure regulation. Hence, the Heckman's DID methodology with PSM in this study is considered appropriate in testing the effectiveness of legal reforms to IRF for emerging economies, and may also be useful for test of certain policy changes in some of the developed economies. The used of artificial windows for like-with-like comparison is also a contribution to research methodology in accounting literature.

The implications of the findings may be useful to economies that have adopted quarterly reporting, or may be considering a reform in entering higher reporting regime. Particularly, this could be applicable to some of the European emerging economies that have similar economic and institutional characteristics to Malaysia, that are currently under economic recovery, and the government that has started to shift some of their attention from the bond market to equity market.

Theory and Hypothesis

Theoretically, higher reporting frequency would allow better information dissemination and thereby lower information asymmetry. Investors become more informed and trade the equity prices of firms towards their true value (actual value). The equity prices at any time in a year become closer to the year-end firm value, which may change the market efficiency.

In fact, higher reporting frequency allows earlier arrival of news, thus increasing information content and timeliness around the additional announcement and reporting period at quarter

one and quarter three in a financial year. Under a better information environment, prior study suggests with empirical evidence that when there is an increase in information content, the importance of earnings as a timely resource information increases with association between annual buy-and-hold returns and 3-day window buy-and-hold returns surrounding the earnings announcement dates (Ball & Shivakumar, 2008) because a firm's equity prices will adjust to the timelier news more rapidly to reflect the information available in market that enhances market efficiency. Consequently, the four quarterly returns around earnings announcement dates are able to explain the annual return better (Ball & Shivakumar, 2008). Hence, the first hypothesis (H_1) in this study is 'the higher reporting frequency results in higher information content and timeliness'.

If this is the case, increased information timeliness will result in fewer surprises to investors around earnings announcement and financial reports dates in a four-quarter reporting regime relative to a bi-annual reporting regime because news that normally being released around quarter two and four is now released around the additional announcement and reporting period at quarter one and quarter three in a financial year. Hence, lower abnormal returns are expected around quarter two and quarter four earnings announcement dates during the four-quarter reporting regime. In addition, when the gap between informed and uninformed investors is reduced, the uninformed investors become less risk-averse because of the increase level of corporate transparency. The investors may be induced to trade more often after this legal reform to IRF. The reduced in information asymmetry may increase the market liquidity and improve the market efficiency. Thus, the second hypothesis (H_2) of this study is 'after the legal reforms, the information timeliness has been improved'. Overall, the two hypotheses in this study explore the effect of legal reform to higher reporting frequency on market efficiency.

Following the mandatory disclosure regulation, the mandatory requirement (i.e. non-voluntary) has forced firm to adopt quarterly reporting for purposes of better corporate transparency, to reduce agency costs and to regain foreign investors' confidence with better investor interest protection. This legal reform to higher reporting frequency was imposed mandatory to all public listed firms, regardless of whether they adopting quarterly reporting before this legal reform to IRF voluntary. The outcome of this investigation on the effect of legal reform to IRF on mandatory adopters should be able to help regulator / policy makers be aware of the effects on the economy should they consider to mandated a change to higher reporting frequency (Leuz & Wysocki, 2006).

Data and Test Period

This study applies event study methodology. The sample data includes public listed firms listed at Bursa Malaysia from 1 February 1996 to 31 December 2002. The earnings announcement dates are extracted from SIRCA's Thomson Reuters Tick History (RDTH) and the financial data is obtained from Datastream. By using panel data analysis, I need to compare the bi-annual reports to four quarter reports. I created artificial windows to make the two reports become four reports at pre-legal reform period, which allow like-with-like comparison to four quarter reports at post-legal reform period. These artificial windows follow the earnings announcement date in the post-legal reform period for two out of four missing quarters in post-legal reform period. These artificial window returns have been tested as random, where the artificial window return has no different from any average 3-day window returns for 90 days before the following earnings announcement date.

Methodology

To identify the treatment effect of legal reform to IRF, I employ Difference-in-differences (DID) methodology, the treatment effect analysis with propensity score matching (Heckman, Ichimura, & Todd, 1998). Alternative matching estimator and the alternate DID with cross-sectional regression are used as robustness tests. DID analysis is used because this method solve many issues, i.e. selection bias, heteroscedasticity, concern of endogeneity and uncertainty of estimates due to other possible legal changes or other factors that may influence the outcome variable of interest, the change in information content (CICT). In fact, the mandatory change to IRF is applicable to all firms listed in Bursa Malaysia. Thus, the choice of firms adopting higher reporting frequency is not subject to a firm's characteristics per se but the legal requirement to IRF, which results in less concern on endogeneity issue (Fu et al., 2012). Firms that adopt quarterly reporting voluntarily before the legal reform to IRF do not have to switch their practice within the two reporting regime. Nonetheless, there may be other factors such as time effect and other legal reforms that may change the firms' equity prices over time within the test period. Therefore, I used DID methodology because on top of examining the effect of higher reporting frequency on MA, DID model also adjusts for any changes to firms that are not due to legal reform to IRF, such as time effect or any other factors that may affect the measures. The net effect of legal reform to IRF is obtained using DID analysis with propensity score matching on the mandatory adopters and voluntary adopters.

Further, I use pooled firm-year cross-sectional regressions for the treated group, the mandatory adopters (MA), to monitor the change in trend of investor behaviour. I also observe December FYE firms that have their financial year overlapped to the calendar year. An additional test on crisis effect is performed by extending the test period from four years to

eight years (1995-2003, based on calendar year basis) in order to examine the differences of results for crisis period and non-crisis period. Finally, I check on the changes in daily return volatility to observe whether the return volatility decreases after the post-legal reform to IRF.

Discussion of Findings

The results from Heckman's DID analysis report a significant treatment effect on mandatory adopters (MA) after the legal reform to higher reporting frequency. The outcome variable, Changes in Information Content and timeliness (thereafter named CICT) of MA at the post legal reform period is significant at 5% level. This CICT of MA has been matched to the benchmark (EA) group and to the outcome variable at the pre-legal reform period for time invariant. The negative ATTs suggest that there is a fall in differences between mandatory adopters and voluntary adopters in their changes of information content and timeliness due to the requirement of higher reporting frequency in the post-legal reform period. The results of this study indicate that the introduction of quarterly reporting is effective and the higher reporting frequency has significantly changed the contribution of information content and timeliness to the total information environment. This finding is consistent with the results reported by Ku Ismail and Chandler (2003) that indicate that a significant relationship exists between timeliness of the quarterly reports and four company's attributes of size, profitability, growth and capital structure in Malaysia (Ku Ismail & Chandler, 2003).

The pooled and firm-year cross-sectional regression analysis reported mixed results. After legal reform to IRF, firms switching from bi-annual to four-quarter reporting regime report significant window returns for quarter one and quarter three in the year of 2002. Theoretically, when investors are more aware of the usefulness of the quarterly reporting, they may react to the first quarter report as it allows them to confirm on the budget and

forecast of the first three months in a firm's financial year; financial analysts may adjust their own forecast by comparing actual performance to the first quarter management forecast. The third-quarter results provide confirmative and cumulative operating results for nine months. Investors and financial analysts may respond to it because it is rational to forecast for the final quarter performance of a firm based on information from the third-quarter financial report. However, these significant results are pronounced in 2002 only. No such significant change can be noted in the regression results observed in the global financial crisis year of 2001, whereas the mandatory adopters (MA) with December financial-year-end have shown ambiguous results.

On the other hand, the regression results on MA firms show reduced significant for quarter two and quarter four in 2002 in the post-legal reform period. These results suggest that investors may have reacted to the earlier arrival of news at the new reporting dates (i.e. quarter one and quarter three). Thus, after legal reform to IRF, the two additional reports at quarter one and quarter three under quarterly reporting regime have allowed timelier news to reach both informed and uninformed investors, thereby reducing the news accumulation carried to quarter two and quarter four in a financial year. This is supported by the analysis outcome on timeliness using information gap in the additional tests. In the post-legal-reform period, the returns volatility has been fallen and become noisy outside the crisis period. These findings suggest a lower information asymmetry, better information environment and market efficiency with higher reporting frequency.

The test results on timeliness show that the abnormal return in the post-legal reform period has been reduced, especially within 45-day and 10-day before an earnings announcement date, for quarter two and quarter four. The magnitude of differences of abnormal return

between the pre- and the post-legal reform period are smaller from 10-day before earnings announcement date to day ‘0’, the earnings announcement date. The findings indicate that there are fewer shocks around quarter two and quarter four, and information asymmetry has been lower because the information gap between informed and uninformed investors becomes closer. Information environment has been improved, especially two months to two weeks before the earnings announcement date.

In this study, the test period falls within the crisis period of 1997 Asian financial crisis and 2001 global financial crisis. The results for these affected years of 1997, 1998 and 2001 are subject to high economy uncertainty. Unfortunately, the study cannot extend too far from the event window because the Malaysian SEC has been established only since 1993 and the data may not be complete for the earlier years. Moreover, many rules and regulations have been revised during and after the crisis period in Malaysia which may further distort the results of analysis should the test period be extended. Even so, in this study, the DID analysis has overcome the concern of other legal reforms and changes due to other factors during the test period.

To capture crisis effect, I have extended the test period to eight calendar years in order to examine if the test results still hold outside the crisis period. In general, the results report that there is no significant increase in the information content and timeliness at the pre-legal reform period of 1996-1998, except for 1995. There is one significant relation of half yearly earnings announcement window return to annual return in 1995 when the economy of Malaysia was at peak. However, in the post-legal reform period, when the economy started to recover from crisis, the results for the years of 2000 and 2002 have been significant. The unfavorable results in year 2001 can be explained by the global financial crisis. There is no

significant results shown for year 2003 and the reason to this outcome of analysis is unknown. In this case, the study shows mixed results. The findings of analysis in this study seem to have 2000 and 2002 support the hypotheses (1) and (2), where the higher reporting frequency increases information content and timeliness. On the other hand, results for year 2001 and 2003 are against the hypotheses that the significant increase of corporate transparency may not be true at the post legal reform period.

Conclusions

In conclusions, the legal reform to reporting frequency has moved equity prices and influenced on investor behaviour. The Heckman's DID methodology with PSM has been appropriate in testing the effectiveness of legal reform to higher reporting frequency. Early arrival of news in three months instead of holding investors for the next six-month after one earnings announcement, has resulted in lower abnormal returns because information reaches investors faster and equity prices adjust more rapidly to reflect their true value. The change to market efficiency in updating firm's true value has reduced the opportunity for informed investors to trade at the expense of uninformed investors. When less informed investors become more informed after firm switching from the bi-annual to four-quarter reporting regime, the market has lower information asymmetry. Generally, investors trade more often when they are less risk-averse within the improved information environment. Based on the research findings in study, I conclude that there are improvements to market transparency and market efficiency after the legal reform to increased reporting frequency. The findings in this study may have implication to the regulator/ policy maker that may consider adopting four-quarter reporting regime, provided the emerging economy has similar institutional characteristics and firm-characteristics to Malaysia, like ownership structure and small-to-medium size firm concentrated. The application of Heckman's DID methodology with

propensity scores matching and the used of artificial windows in this study are considered appropriate in testing the effectiveness of legal reforms to IRF for emerging economies, and may also be useful for some developed economies.

7.2 Limitations and Future Research

This section discussed the limitations and possible of future research in general.

Ideally, we would measure the contribution of quarterly reporting to the information environment and compare the evidence from emerging economy to that developed economies. Due to the limitation of data availability, this study only covers a portion of firms listed in Bursa Malaysia. The Malaysian SEC has been established since 1993, and financial data used in this study from year 1995 to 1998 are subject to information available online in the data sources and from Bursa Malaysia. Financial data of the Malaysia market is more complete and comprehensive nowadays, especially after 2000. Even though more data has been made available online in 2000s, the usage of panel data in this study required the data to be matched for the periods before and after the legal reform to higher reporting frequency causing some sample firms being discarded due to data cleaning in this study.

Another limitation involves the use of estimates. The main analyses outcome in this study is based on estimates from Heckman's DID models using propensity scores matching (thereafter named PSM). There are estimates of conditional probabilities utilizing PSM analysis. To minimize the uncertainty that may be involved due to the estimates, OLS regressions on panel data and pooled firm-year cross-sectional regressions are performed as a robustness check.

Nonetheless, there are few other ways to extend this current study, like employing other measurements based on the well-established literature. First, following Butler et al. (2007), I may further measure information timeliness with two different approaches based on the basic concepts of timeliness: (1) IPT, which denotes intra-period timeliness, it measured the speed

of information incorporated into equity prices (which is similar to (Ball & Brown, 1968) and (Alford et al., 1993)), and (2) long-horizon timeliness (Basu, 1997; Bushman et al., 2004). Long-horizon timeliness estimates the explanatory power of a returns-earnings regression or the magnitude of slope coefficient in such a regression, with standard proxies of accounting income lag economic return (Butler et al., 2007). The association between annual earnings (from the report) and annual equity returns will be strengthened if the increased frequency of quarterly reporting enhances information timeliness.

Next, an extension to the detail the effects of this legal reform to IRF on firms with different characteristics, such as size, level of corporate governance, and firms which release bad news instead of good news, level of return volatility, leverage, and different industrial sectors can be performed. For example, theoretically, information on smaller firms is more available after the legal reform to IRF. Appendix 9 shows that the Malaysian equity market is mainly (approximately 87% in year 2001/02) covered by small and medium size firms. Management may have the incentive to release bad news with more frequent quarterly reporting instead of postponing. Firms with poor governance are expected to have more agency conflicts between shareholders and management, and to be less transparent in operation. More significant impacts from the legal changes to the reporting frequency on firms with poor governance are expected than on those with good governance. Increased frequency of periodic reporting can be essential to firms which require more frequent monitoring, like firms with higher level of return volatility and higher leverage. The changes in reporting frequency may reduce the information asymmetry of high volatility firms than for low return volatility firms. The effect of higher reporting frequency may be more pronounced on high leverage firms, which is normally required higher level of transparency relative to low leverage firms, or vice versa. Appendix 10 shows a sample set of Malaysian listed firms used in this study that includes

approximately 47% of manufacturing sector and 17% of finance sector. The effect of IRF could be different for firms in different industrial sectors.

Further, this study shows evidence that higher reporting frequency may change the level of corporate transparency and market information asymmetry. It will be interesting to investigate directly the impact on information asymmetry, by examining how information asymmetry changes with information content and timeliness, which is done by running regression on information asymmetry against changes to information content and timeliness (CICT), where bid-ask-spread is used to proxy information asymmetry and CICT is the beta coefficient of regression on annual returns and EADs returns. The trading volume would change with the changes in bid-ask-spread. Hence, the changes in information asymmetry may lead to changes in liquidity and the cost of equity.

Comparing the results of this research work obtained further from an emerging economy, Malaysia to a developed economy with similar institutional background, like Singapore, will also be useful. This can be performed by collecting data on Singapore from Singapore equity exchange for the period of time when those firms that are partially mandated to file quarterly reports are required to switch from bi-annual to four-quarterly reporting regime. A similar research design to that in this study can be applied to this developed economy to allow like-with-like comparison.

From a different study perspective, there are two possibilities of future research can be considered here. Based on the current data availability, I may further investigate the effect of legal reform to IRF from the financial analyst and management perspective. From financial analyst perspective, higher reporting frequency is expected to improve analyst forecast

accuracy. Some professional investors have found the quarterly report to be useful for predicting the result and for comparison with previous forecast (Ku Ismail & Chandler, 2005c). *Will the increase frequency in reporting reduce the financial forecast errors?* It is argued that increased timeliness may reduce the predictive value of interim reports (Mensah & Werner, 2008) and mitigate uncertainty. There is also a possibility that the firm may postpone most of the negative adjustment towards the end of the quarter (Ku Ismail & Chandler, 2005) in order to show a positive image, while having time to find solutions for these negative events before the final reporting (Brown & Caylor, 2005). More timely information released to financial analysts should result in more accurate forecasts by analysts and therefore should reduce the forecast errors and forecasts dispersion among analysts. Would the investors become less heterogeneous, forming less difference in opinion after the legal reform?

From a management perspective, it is arguably that higher reporting frequency may encourage management in managerial short-termism (Gingler et al., 2014; Rahman, Tay, Ong and Cai, 2007). Management may be induced to invest in short term high NPV project and foregone some of the long term profitable projects. This is because management may intend to increase the equity prices at current stage for better performance measurement (Gigler et al., 2014). This incentive to management myopia may lead management towards earnings management (Rahman et al., 2007), such as manipulating provision for accruals or cutting research and development (R&D) costs. R&D is one of the investments that will only bring benefits to firm over long term. This managerial short-termism has been one of the reasons for the European Union Parliament's rejection of the proposal of switching to quarterly reporting mandatorily in year 2004 (Gingler et al., 2014; Rahman et al., 2007). According to Bhojraj and Libby (2005), "Some of Europe's most powerful investors are calling on the

European Commission to drop plans to introduce mandatory quarterly reporting for companies.... It (quarterly reporting) has not helped prevent corporate scandals in the United States, and there is risk that it will encourage short-termism." (Financial Times, January 27, 2003). However, the management short-termism may also be explained by investor's short-termism, where some speculating (short term) investors would like to maximize seasonal returns from their short term investments instead of long term investments (Gigler et al., 2014), as reported by Bhojraj and Libby (2005) on the criticism in Hong Kong (Investor relations Magazine, November 15, 2002). Hence, the management behaviour may be driven by the shareholder's behaviour towards short-termism. Therefore, it will be worthwhile to examine if firms that are mandated to switch to four-quarter reports and are more affected by higher reporting frequency would have a lower earnings management in the post-legal reform period than the pre-legal reform period, relative to mandated firms that are less affected by this legal reform to IRF.

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APPENDICES

APPENDIX 1

Details of Major Changes in Rules and Regulations in Malaysia (Year 1996-2003)

1997 July Asian Financial Crisis

1998 April 01 Amendment of Security Act 1983 on Insider trading

With the new regulations framework for insider trading, the Securities Commissions and investors are enhanced with the power in civil action against the any insider trading activities. This is to deter insider trading and manipulation activities that may result a loss or damage to investors. The amendment has been made to the Security Act 1983 and the Security Industries Act to enhance investor protection and market integrity with effective from 1 April 1998. (Securities Commission, 1998d).

Under Civil penalties, investors will be fully compensated for loss or damages, and the full range of orders available under section 100 of the SIA as well as under the inherent powers of Malaysia courts. The criminal penalty is imprisonment for not more than 10 years and a fine at least one million ringgit. (Securities Commission, 1998d).

1998 May 01 Security Industry act 1998- Reporting of Substantial shareholdings

Under section 9 of the Securities Industry Act, any changes on substantial shareholdings, share obtained or cease of substantial shareholdings are required to give notice within 14 days after its occurrence. Any person who does not follow the rules commits an offence.(Security Industry Act, 1983).

1998 July 02 Strengthen listing rules on related party transaction

The change of law required a company to appoint independent corporate advisor to advise the minority shareholders to ensure fairness and reasonableness of a transactions (SC and Bursa Malaysia reviewed on Rule 118 and reflected on Rule 111 &120). This is to prevent directors, substantial shareholders and connected person in passing resolutions on any related party transaction. Additional disclosure required on related party transactions, in terms of liabilities assumed and the original costs of investment for acquisition and disposal of assets, plus the source of funds; It is just not applied to PLCs and directors, but also between PLCs.(Securities Commission, 1998f).

1998 September 01 Capital Control implemented

Malaysia government implemented capital controls in 1998. The control of capital in 1998 had imposed restrictions on the international purchases and sales of financial assets. The interest had been cut and the inflow and outflow of capital being restricted. There was a peg on 3.8 ringgit to US dollar to close the currency floating of Malaysia ringgit outside Malaysia market. (Johnson et al., 2000).

1999 January 01 Revamped of Malaysian Code on Takeover and Mergers

This code come into force of Securities Commission Act 1993(Subsection 33A (1). It is to impose criminal liability on the relevant parties that provide false or manipulate the information to SC and investors. It is also allow the 2% takeover for those who hold 33% to 50% voting shares within 6 months instead 12 months.(Securities Commission, 1999g).

1999 March 26 Release of Finance Committee Report on Corporate Governance

An output of High-level Finance Committee Report on Corporate Governance in February 1999. In March 1998, a High-level Finance Committee on Corporate Governance which comprised of both the government and industry has been formed to investigate the weakness in the existing corporate governance framework triggered by the crisis. They issued the Finance Committee Report on Corporate Governance in March 1999. The key areas of this Finance Committee Report on Corporate Governance and recommendations in Malaysian Corporate Governance reform agenda are to investigate and provide recommendations that would enhance minority shareholder's protection, increase transparency with adequate disclosures, independency and accountability of directors, on top of strengthening regulatory enforcement and promoting training education for directors (FCCG, 1999; Securities Commission of Malaysia, 2008a).

1999 June 15 Security Industry Act 1999

(Compliance with Approved Accounting Standards)

This would not major in affecting the information environment as all the PLCS are required to complied with Approved accounting Standards by MASB since July 1997.(Security Industry Act 1983, 1999).

The impact has been mitigated by MASB's requirement on mandate compliance with Approved Accounting Standards in year 1997.

1999 July 31

Mandate Quarterly reporting & early release of Audited Annual Report

- Mandatory quarterly reporting (within 2 months) and annual audited accounts with auditors and directors' report (reduced from 6 to 4 months) required by Bursa Malaysia with effective from 31 July 1999. PLCs may voluntarily commence filing immediately. Penalty for non-compliance are suspension in listing and follow by de-listing.(Bursa Malaysia, 1999).

1999 December

Equity participation by independent directors

The Policies and Guidelines on Issuer/ Offer of Securities have been amended to facilitate equity participation by independent directors. This is in line with the second phase of DBR with press release dated 31 December 1999 which stated the changes on pricing of securities, valuations of Assets and utilisation of proceed. In January 2001, the exchange has changed the listing requirements to require at least 1/3 independent directors on board.(Securities Commission, 2009e).

This should not be an issue as since 1987, the Securities Commission introduced mandatory requirements for independent directors to all PLCs.(Securities Commission, 2005h).

2000 January 01

Shifting from MBR to DBR: Phase 2

DBR focus on new issues or offers. Under DBR regime, the authorities regulate the quality of disclosure and investors determine in the merits of investment. It focuses on better investor protection, higher transparency and market efficiency. Phase 1 had started from January 1996-1999; phase2 in year 2000 and phase 3 started from 2001 to 2003. This is to ensure timely and accurate disclosure on primary offering; continuous disclosure on listed securities; and disciplines set on securities pricing and valuation. (Securities Commission, 1999j).

2000 March

Introduction of Malaysian Code on Corporate Governance

No press release available according to Securities Commission.

MCCG is the Code with Principles (part 1) set; best practices in corporate governance (part 2) recommended; exhortations to other participants (part 3) and explanatory notes (Part 4) provided.(MCCG, 2000). This is a voluntary compliance of best practices. (Securities Commission of Malaysia, 2008a)

However, effective from 1st June 2001 onwards, the PLCS are required to disclose the principles applied and best practices complied with, and failure of compliance may cause suspension by the exchange.(Bursa Malaysia, 2001). This Code has been revised in year 2007 where the key amendments

are in strengthening the roles and responsibilities of board of directors and audit committees. These includes clearly stated the criteria for appointment of directors, the composition of board, the role of nominating committee and how the independent non-executive may function more effectively. (Refer to Appendix 2(a)).

2000 July 01

Law amendment to harmonize the regulatory regime for prospectus

The changes on Securities Commission (Amendment) Act 2000 to delineated and streamline the regulatory regime for prospectus. (Securities Commission, 2009e).

2001 January 01

Shifting from MBR to DBR: Phase 3 (completed on 01 April 2003)

2001 February 15

Major Revamped on KLSE listing requirements

This was announced on 22 January 2001 and was recognised as a major milestone in Malaysian Corporate governance reform. The main objective was to enhance the standards of corporate governance and investor protection. This release was marked as the most successful implementation of a significant component among the recommendations made in Finance Committee Report on Corporate Governance.(Securities Commission, 2009e).

The key changes are:

- (1) *Maintenance of financial condition that justifies continued trading and/ or listing (effective on 15 February 2001; extended regularize time frame up to 31 December 2002).*
- (2) *Implementation of Directors' Education programme*
- (3) *Disclosure requirements on compliance with Malaysian Code on Corporate Governance and the state of internal control*

Practice Notes are issued and failure to comply may lead to suspension from trading. (Bursa Malaysia, 2001)

*According to the Press Release dated 22 January 2001, all provisions in the revamped listing requirements would take effect from **01 June 2001** except for the following that would take force from **15 February 2001**. (Bursa Malaysia, 2001).*

Chapter 1: Changes in definitions

Chapter 2: Paragraph 2.08 on Practice Notes for interpretation of provisions

Chapter 8: Paragraph 8.14C on financial condition and level of operation, where the firm must warrant continued trading and/ or listing on the Official List (at Bursa Malaysia), failing to comply may result in **de-listing** by the Exchange (the time frames for listed companies to regularise their financial condition have been extended to 31 December 2002); **Paragraph 8.23** on Provision of Financial Assistance

Chapter 15: Paragraph 15.09 on Directors' training

Chapter 16: Paragraph 16.02(d) on Suspension of trading imposed by the Exchange; **Paragraph 16.09(b)** on De-listing by the Exchange.

2001 June 01

The major revamped of KLSE listing requirements

includes compulsory disclosure in relation to extent of compliance towards

*Malaysian Code on Corporate Governance (for all annual reports with financial year ending after **30 June 2001**). Under paragraph 15.26 of the KLSE listing requirements, the PLCs are required to state how the principles of part 1 in the Code has been applied and the extent of the best practices in part 2 has been complied with. Failure of doing so will allow the exchange suspend the PLCs from trading (Bursa Malaysia, 2001) and section 11 of the security Industry Act 1983.(MCCG, 2000).*

*The state of Internal Control (for all annual reports with financial year ending after **31 December 2001**).(Bursa Malaysia, 2001).*

2001 July 01

Announcement on commencement of Minority Shareholder Watchdog Group (MSWG) operation

MSWG was established on 30th August 2000, a non-profit organization (public company limited by guarantee), formed by 5 institutional investors leading by EPF (Employees Provident Fund). (MSWG, 2009a).

The vision is to enhance shareholder activism and protecting minority interests. The objectives are to provide a forum, think-tank and resource centre for minority interest and corporate governance matters; it is to influence the decision making process in PLCs and monitor for breaches in non-compliance of corporate governance. The mission is to increase capital market effectiveness and efficiency. (MSWG, 2009b)

It was said to promote better and more effective Corporate Governance practices relative to Code on Corporate Governance which could become a benchmark for others in the region. However, from the analysis performed within 1-15 March 2006, the weaknesses of MSWG were said to be lack of wide spread awareness of its existence and negative shareholders perception in lack of enforcement in market.(MSWG, 2006c).

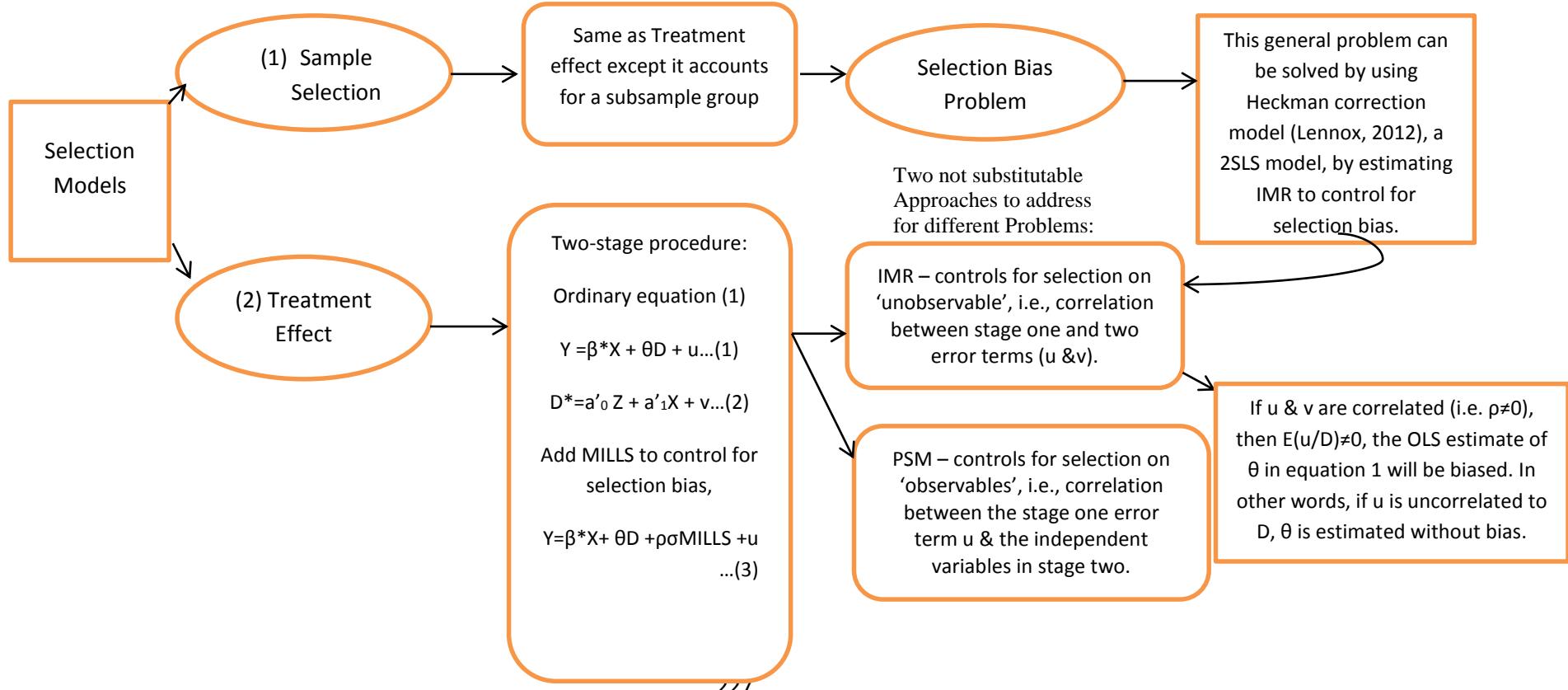
*MSWG has been granted license on 4th March 2002 as investment adviser by
SC.(Securities Commission, 2009e).*

APPENDIX 2

Diagram on Treatment Effect Analysis

This diagram shows the analyses using Selection models for valuation of treatment effects.

There are assumptions and conditions that need to be fulfilled in utilizing selection models. The non-fulfillment could result in inconsistent estimates and selection bias concern.



APPENDIX 3

Inverse Mills Ratio (IMR)

Statistically, IMR is a conditional probability, a ratio between the standard normal probability density function (PDF) and standard normal cumulative density function (CDF). In 2SLS, it is generated from Probit regression and added to the stage two OLS regression to remove selection bias. (Wooldridge, 2013). It is used in estimating conditional average treatment effect on treated (ATT). ATT can be estimated from the sum of the differences between treated and untreated multiply to Inversed Mills Ratio (IMR).

Conditional average treatment effect on treated (ATT) for treated group with characteristic Xs, $E[Y_{1i} - Y_{0i} | D=1] = \sum \delta_x P(X_i = x | D=1)$ equation (14)

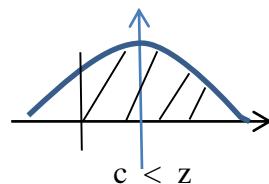
Where, Y_{1i} is the outcome of treated group and Y_{0i} is the outcome of untreated. $D=1$ if a firm is treated and $D=0$ if it is untreated firm. δ_x is the differences between treated and untreated, and $P(X_i = x | D=1)$ is the IMR.

$$\delta_x = E[Y_i | X_i, D=1] - E[Y_i | X_i, D=0] \quad \text{equation (16)}$$

$$P(X_i = x | D=1) = \frac{[P(D_i = 1 | X_i = x) \cdot P(X_i = x)]}{P(D_i = 1)} \quad \text{equation (16)}$$

From statistics perspective, IMR is an estimate of z with condition $z > c$, assumes that z is normally distributed. The formula of IMR is as below:

$$E(z | z > c) = \varnothing(c) / [1 - \Phi(c)] \quad \dots \quad \text{equation (11)}$$



Where, $\varnothing(c)$ is the standard normal density function and $\Phi(c)$ is normal cumulative density function (CDF). It is normally presented as lambda (λ) from Heckman correction model generated from the Probit analysis.

APPENDIX 4
Summary Statistics for Yearly BH Returns (Fiscal Year) and
BH Returns in the Bi-Annual and Quarterly Earnings Announcement Windows

This table presents the summary of descriptive statistics for Fiscal year analysis. The table accounts for Yearly Buy-and-Hold Returns (BHRs) and Window BHRs in the semi-annual and quarter earnings announcement for year FYE 1997 to 2002. The BHRs are computed from Daily Prices in the Datasream database.

Panel A: Arithmetic Return		No. of Obs.	Mean	Median	Skewness
	FYE				
Yearly Buy-and-Hold Returns	1997-2002 mean	472	-0.015	0.000	0.359
	<i>t-statistic</i>		-0.90		
Pre-reform	1997-1998 mean	236	-0.043	-0.004	0.267
Post-reform	2001-2002 mean	236	0.014	0.000	1.133
	<i>t-statistic</i>		-1.78*		
	<i>p-value</i>		0.076		
Earnings-announcement Window					
Buy-and-Hold Returns					
Semi-annual 1	1997-1998 mean	236	-0.012	-0.012	0.803
	<i>t-statistic</i>		-2.11**		
Semi-annual 2	1997-1998 mean	236	0.011	0.000	1.281
	<i>t-statistic</i>		1.85*		
Quarter 1	2001-2002 mean	236	-0.001	0.000	-1.794
	<i>t-statistic</i>		-0.38		
Quarter 2	2001-2002 mean	236	-0.004	0.000	0.020
	<i>t-statistic</i>		-1.13		
Quarter 3	2001-2002 mean	236	0.000	0.000	-0.134
	<i>t-statistic</i>		0.09		
Quarter 4	2001-2002 mean	236	-0.004	0.000	-0.421
	<i>t-statistic</i>		-1.45		

* , ** and *** indicates the significant level below 0.10, 0.05 and 0.01 respectively.

Panel B: Arithmetic Return

Mandatory Adopters

	FYE	No. of Obs.	Mean	Median	Skewness
Yearly Buy-and-Hold Returns	1997-2002 mean <i>t-statistic</i>	444	-0.012	0.000	0.342
Pre-reform	1997-1998 mean	222	-0.035	0.000	0.249
Post-reform	1999-2001 mean <i>t-statistic</i> <i>p-value</i>	222	0.011 -1.35 0.177	0.000	1.045

Earnings-announcement Window

Buy-and-Hold Returns

Semi-annual 1	1997-1998 mean <i>t-statistic</i>	222	-0.012 -1.93*	-0.012	0.788
Semi-annual 2	1997-1998 mean <i>t-statistic</i>	222	0.013 2.17**	0.000	1.303
Quarter 1	2001-2002 mean <i>t-statistic</i>	222	-0.001 -0.31	0.000	-1.811
Quarter 2	2001-2002 mean <i>t-statistic</i>	222	-0.005 -1.63	0.000	-0.058
Quarter 3	2001-2002 mean <i>t-statistic</i>	222	-0.001 -0.32	0.000	-0.293
Quarter 4	2001-2002 mean <i>t-statistic</i>	222	-0.005 -1.66*	0.000	-0.392

*, ** and *** indicates the significant level below 0.10, 0.05 and 0.01 respectively.

Panel C: Arithmetic Return
Early Adopters (Benchmark Group)

	FYE	No. of Obs.	Mean	Median	Skewness
Yearly Buy-and-Hold Returns	1997-2002 mean <i>t-statistic</i>	28	-0.051	-0.008	0.687
Pre-reform	1997-1999 mean	14	-0.175	-0.058	-0.794
Post-reform	1999-2001 mean <i>t-statistic</i> <i>p-value</i>	14	0.073 -2.35** 0.027	0.000	2.787

Earnings-announcement Window

**Buy-and-Hold
Returns**

Semi-annual 1	1997-1998 mean <i>t-statistic</i>	14	-0.020 -1.58	-0.015	-0.402
Semi-annual 2	1997-1998 mean <i>t-statistic</i>	14	-0.026 -1.31	-0.034	0.348
Quarter 1	2001-2002 mean <i>t-statistic</i>	14	-0.004 -0.50	0.000	-0.110
Quarter 2	2001-2002 mean <i>t-statistic</i>	14	0.024 1.87*	0.008	1.842
Quarter 3	2001-2002 mean <i>t-statistic</i>	14	0.030 1.56	0.000	2.260
Quarter 4	2001-2002 mean <i>t-statistic</i>	14	0.009 1.35	0.008	0.738

*, ** and *** indicates the significant level below 0.10, 0.05 and 0.01 respectively.

APPENDIX 5

Summary of Additional work on Descriptive Statistics

In Appendix 4, there is significant change to the equity prices due to the effect of legal reform on investors' behaviour. The statistics of yearly mean buy-and-hold returns in fiscal year for all sample (Panel A) of 118 firms with 472 observations show that the difference in mean returns for pre-legal reform period and post-legal reform period is significant at 10% level. However, there is no evidence of significance for the same returns from the mandatory group (Panel B), but significance at the 5% level for the early adopters (Panel C). This may be explained by the changes within this small number (28 observations) of early adopters during this period of 1997-2002 that could be due to the crisis in year 2001 since they are mostly cross-listed firms to ADR in United States. These findings are obtained from simple t-test analysis, which have not been adjusted for time effect and selection bias.

The simple measures of window returns indicate much lower buy-and-hold returns for each quarter after the financial reporting regime has been shifted to four-quarterly from the bi-annual reporting. Prior to 1999, in Appendix 4 (Panel A), the mean window returns for the first bi-annual earnings announcement is reported as significant at 5% level but negative, where else the second bi-annual buy-and-hold returns is positive and significant at level of 10%. However, the average quarterly returns for the all sample set after the legal reform are mostly close to zero and insignificant. For mandatory adopters group (Panel B), the quarter two and four's window returns are barely significant at 10% of 1.63 and 1.66 respectively. On the other hand, the early adopters group (Panel C) has a 10% significant window at quarter two and lost its significance towards the final quarter. All the panels sample have skewness within ± 2.0 (normally skewness < 3.0 or > -3.0 is acceptable), except for skewness

in quarter three of early adopters (Panel C) which shows a 2.26. In short, there information gap among investors reduced after the legal reform to IRF since the buy-and-hold returns for quarter two and four has been reduced after the legal reform to IRF.

A robustness check on sample data for Calendar year basis, a different roll of test period other than fiscal year, has been performed (Appendix 6). The checked period covers two years period immediately before and two years immediately after the effective enforcement date of legal reform. The original data has been logarithmic transformed for normality and sensitivity check. The statistic outcomes of logarithmic buy-and-hold returns are quite consistent with the outcomes of the arithmetic buy-and-hold returns as presented in Appendix 4.

APPENDIX 6
Summary Statistics for Yearly BH Returns (Calendar Year) and
BH Returns in the Bi-Annual and Quarterly Earnings Announcement Windows

This table presents the summary of descriptive statistics for Yearly Buy-and-Hold Returns (BHRs) and Window BHRs in the bi-annual and quarter earnings announcement for year July 1997 to July 2001. The BHRs are computed from Daily Prices in the Datasream database.

Panel A: Arithmetic Return		No. of Obs.	Mean	Median	Skewness	% Obs	
	<u>Full Sample Data</u>					=0	>0
Yearly Buy-and-Hold Returns	1997-2001 mean	860	0.1345	-0.178	2.123	1.16	38.84
	<i>t-statistic</i>		3.782**				
Pre-reform	1997-1999 mean	430	0.357	-0.084	1.345	0	48.60
Post-reform	1999-2001 mean	430	-0.087	-0.180	2.491	2.33	29.30
	<i>t-statistic</i>		6.37				
	<i>p-value</i>		<0.0001**				
Earnings-announcement Window							
Buy-and-Hold Returns							
Semi-annual 1	1997-1999 mean	430	0.003	0.000	0.546	9.77	42.33
	<i>t-statistic</i>		0.442				
Semi-annual 2	1997-1999 mean	430	0.005	0.000	2.306	12.79	37.91
	<i>t-statistic</i>		0.202				
Quarter 1	1999-2001 mean	430	-0.011	0.000	0.00	17.67	31.16
	<i>t-statistic</i>		-5.422**				
Quarter 2	1999-2001 mean	430	-0.011	0.007	5.628	12.33	33.02
	<i>t-statistic</i>		-2.593**				
Quarter 3	1999-2001 mean	430	-0.002	0.000	1.975	15.81	35.35
	<i>t-statistic</i>		-0.836				
Quarter 4	1999-2001 mean	430	0.003	0.000	1.717	15.58	37.67
	<i>t-statistic</i>		1.232				

* and ** indicates the significant level below 0.05 and 0.01 respectively.

Panel B: Logarithmic Return

Full Sample Data

		No. of Obs.	Mean	Median	Skewness	% Obs =0	% Obs >0
Yearly Buy-and-Hold Returns	1997-2001 mean	860	-0.280	-0.196	-0.437	0.81	39.07
	<i>t-statistic</i>			-8.460**			
Pre-reform	1997-1999 mean	430	-0.382	-0.088	-0.161	0	48.60
Post-reform	1999-2001 mean	430	-0.178	-0.198	0.530	1.63	29.77
	<i>t-statistic</i>			-3.11			
	<i>p-value</i>			0.002**			

Earnings-announcement Window

Buy-and-Hold Returns

Semi-annual 1	1997-1999 mean	430	-0.001	0.000	-0.295	8.60	42.79
	<i>t-statistic</i>		0.880				
Semi-annual 2	1997-1999 mean	430	0.002	0.000	1.364	10.93	38.66
	<i>t-statistic</i>		0.597				
Quarter 1	1999-2001 mean	430	-0.012	0.000	-0.300	16.05	31.86
	<i>t-statistic</i>		-5.808**				
Quarter 2	1999-2001 mean	430	-0.015	-0.008	1.998	11.16	33.95
	<i>t-statistic</i>		-3.808**				
Quarter 3	1999-2001 mean	430	-0.004	0.000	0.810	13.72	35.81
	<i>t-statistic</i>		-1.444				
Quarter 4	1999-2001 mean	430	0.002	0.000	0.676	13.72	39.07
	<i>t-statistic</i>		0.680				

* and ** indicates the significant level below 0.05 and 0.01 respectively.

Panel C: Arithmetic Return

Mandatory Adopters

		No. of Obs.	Mean	Median	Skewness	% Obs =0	% Obs >0
Yearly Buy-and-Hold Returns	1997-2001 mean	812	0.134	-0.178	2.141	0.99	38.92
	<i>t-statistic</i>		<i>3.640**</i>				
Pre-reform	1997-1999 mean	406	0.358	-0.084	1.357	0	48.52
Post-reform	1999-2001 mean	406	-0.090	-0.180	2.530	1.97	29.56
	<i>t-statistic</i>		<i>6.21</i>				
	<i>p-value</i>		<i><0.0001**</i>				

Earnings-announcement Window

Buy-and-Hold

Returns

Semi-annual 1	1997-1999 mean	406	0.005	0.000	0.579	9.85	42.86
	<i>t-statistic</i>		1.170				
Semi-annual 2	1997-1999 mean	406	0.005	0.000	2.327	13.30	37.93
	<i>t-statistic</i>		1.337				
Quarter 1	1999-2001 mean	406	-0.011	0.000	0.029	17.24	30.79
	<i>t-statistic</i>		<i>-5.245**</i>				
Quarter 2	1999-2001 mean	406	-0.012	-0.008	5.689	12.32	32.76
	<i>t-statistic</i>		<i>-2.594**</i>				
Quarter 3	1999-2001 mean	406	-0.002	0.000	2.138	16.26	34.98
	<i>t-statistic</i>		-0.649				
Quarter 4	1999-2001 mean	406	0.004	0.000	1.759	15.76	37.68
	<i>t-statistic</i>		1.272				

* and ** indicates the significant level below 0.05 and 0.01 respectively.

Panel D: Logarithmic Return

Mandatory Adopters

		No. of		% Obs	% Obs		
		Obs.	Mean	Median	Skewness	=0	>0
Yearly Buy-and-Hold Returns	1997-2001 mean	812	-0.285	-0.196	-0.435	0.62	39.16
	<i>t-statistic</i>		-8.324**				
Pre-reform	1997-1999 mean	406	-0.390	-0.088	-0.155	0	48.52
Post-reform	1999-2001 mean	406	-0.181	-0.198	0.521		
	<i>t-statistic</i>		-3.07			1.23	30.05
	<i>p-value</i>		0.002**				

Earnings-announcement Window

Buy-and-Hold Returns

Semi-annual 1	1997-1999 mean	406	0.001	0.000	-0.269	8.87	43.35
	<i>t-statistic</i>		0.077				
Semi-annual 2	1997-1999 mean	406	0.002	0.000	1.383	11.33	38.42
	<i>t-statistic</i>		0.609				
Quarter 1	1999-2001 mean	406	-0.012	0.000	-0.285	16.01	31.53
	<i>t-statistic</i>		-5.620**				
Quarter 2	1999-2001 mean	406	-0.015	0.008	2.043	11.08	33.74
	<i>t-statistic</i>		-3.808**				
Quarter 3	1999-2001 mean	406	-0.003	0.000	0.906	14.29	35.47
	<i>t-statistic</i>		-1.230				
Quarter 4	1999-2001 mean	406	0.002	0.000	0.692	13.79	39.16
	<i>t-statistic</i>		0.738				

* and ** indicates the significant level below 0.05 and 0.01 respectively.

Panel E: Arithmetic Return Early Adopters (Benchmark)		No. of Obs.	Mean	Median	Skewness	% Obs =0	% Obs >0
Yearly Buy-and-Hold Returns	1997-2001 mean	812	0.134	-0.178	2.141	0.99	38.92
	<i>t-statistic</i>			<i>3.640**</i>			
Pre-reform	1997-1999 mean	406	0.358	-0.084	1.357	0	48.52
Post-reform	1999-2001 mean	406	-0.090	-0.180	2.530	1.97	29.56
	<i>t-statistic</i>			<i>6.21</i>			
	<i>p-value</i>			<i><0.0001**</i>			
<hr/>							
Earnings-announcement Window Buy-and-Hold Returns							
Semi-annual 1	1997-1999 mean	406	0.005	0.000	0.579	9.85	42.86
	<i>t-statistic</i>			<i>1.170</i>			
Semi-annual 2	1997-1999 mean	406	0.005	0.000	2.327	13.30	37.93
	<i>t-statistic</i>			<i>1.337</i>			
Quarter 1	1999-2001 mean	406	-0.011	0.000	0.029	17.24	30.79
	<i>t-statistic</i>			<i>-5.245**</i>			
Quarter 2	1999-2001 mean	406	-0.012	-0.008	5.689	12.32	32.76
	<i>t-statistic</i>			<i>-2.594**</i>			
Quarter 3	1999-2001 mean	406	-0.002	0.000	2.138	16.26	34.98
	<i>t-statistic</i>			<i>-0.649</i>			
Quarter 4	1999-2001 mean	406	0.004	0.000	1.759	15.76	37.68
	<i>t-statistic</i>			<i>1.272</i>			

* and ** indicates the significant level below 0.05 and 0.01 respectively.

Panel F: Logarithmic Return

Early Adopters

(Benchmark)

		No. of			% Obs	% Obs	
		Obs.	Mean	Median	Skewness	=0	>0
Yearly Buy-and-Hold Returns	1997-2001 mean	812	-0.285	-0.196	-0.435	0.62	39.16
	<i>t-statistic</i>						
Pre-reform	1997-1999 mean	406	-0.390	-0.088	-0.155	0	48.52
Post-reform	1999-2001 mean	406	-0.181	-0.198	0.521		
	<i>t-statistic</i>						
	<i>p-value</i>					1.23	30.05

Earnings-announcement Window

Buy-and-Hold

Returns

Semi-annual 1	1997-1999 mean	406	0.001	0.000	-0.269	8.87	43.35
	<i>t-statistic</i>						
Semi-annual 2	1997-1999 mean	406	0.002	0.000	1.383	11.33	38.42
	<i>t-statistic</i>						
Quarter 1	1999-2001 mean	406	-0.012	0.000	-0.285	16.01	31.53
	<i>t-statistic</i>						
Quarter 2	1999-2001 mean	406	-0.015	0.008	2.043	11.08	33.74
	<i>t-statistic</i>						
Quarter 3	1999-2001 mean	406	-0.003	0.000	0.906	14.29	35.47
	<i>t-statistic</i>						
Quarter 4	1999-2001 mean	406	0.002	0.000	0.692	13.79	39.16
	<i>t-statistic</i>						

* and ** indicates the significant level below 0.05 and 0.01 respectively.

APPENDIX 7
Sample Set of MA and EA for Period 1997-2002- By Financial Year End

Financial Year End	No. of Firms
January	6
February	2
March	21
April	6
May	2
June	15
July	2
August	4
September	6
October	2
November	0
December	92
Total	158
Mandatory Adopters (MA)	109
MA*DEC FYE	67 ➔ 67/109 = 62%

APPENDIX 8

Validity Tests on Instrument Variable: Size

. use "F:\SAS 4\Method12\Coeff_340.dta", clear

. regress ma size agency

Source	SS	df	MS	Number of obs = 340 F(2, 337) = 14.96 Prob > F = 0.0000 R-squared = 0.0815 Adj R-squared = 0.0761 Root MSE = .2265			
Model	1.53460124	2	.767300621				
Residual	17.2889282	337	.051302457				
Total	18.8235294	339	.055526635				

ma	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
size	-.0361646	.0080277	-4.50	0.000	-.0519553	-.0203739
agency	.0145564	.0081348	1.79	0.074	-.0014449	.0305577
_cons	1.442013	.1108176	13.01	0.000	1.224032	1.659994

. predict e, residual

. regress coeff1 period agency e

Source	SS	df	MS	Number of obs = 340 F(3, 336) = 1.95 Prob > F = 0.1207 R-squared = 0.0171 Adj R-squared = 0.0084 Root MSE = 2.8748			
Model	48.4455731	3	16.1485244				
Residual	2776.80582	336	8.26430304				
Total	2825.25139	339	8.33407491				

coeff1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
period	-.7478853	.3118842	-2.40	0.017	-1.361377	-.1343936
agency	-.0222785	.0995384	-0.22	0.823	-.2180754	.1735184
e	.2081276	.6913992	0.30	0.764	-1.151889	1.568144
_cons	.9239062	.2210811	4.18	0.000	.4890288	1.358784

APPENDIX 9

Summary of Selected Sample by Size

Firms categorized in Size based on Average Total assets in Year 2001-2002

Firms are categorized based on the average total assets of sample population for 582 firms within year 2001-2002 using total assets from Datastream. The cut off line of average total assets is set as RM 1.5 million. The distribution of average total assets for year 2001-2002 is shown in Part (II) below.

(I) Firms categorized in Size

Category	Sample Population 582 firms	Sample Selected 109 firms	Sample Selected (85firms)
Small	87% (508)	72% (78)	65% (55)
Large	13% (74)	28% (31)	35% (30)

(II) Average Total assets in Year 2001-2002

Total Assets (RM*)	# of firms	Cumulative # of firms	Cumulative %
<100K**	141	141	24%
>100K	329	470	81%
>1000K	93	563	97%
>10,000K	18	581	99.9%
>100,000K	1	582	100%
Total number of firms	582		

*RM denotes Ringgit Malaysia

**K denotes 1000.

The numbers of firms in the sample data of this study is 109 for Mandatory adopters, there are 78 (72%) firms are small and 31 (28%) are large firms. The measure is based on the average total assets of 582 firms with more complete total assets data available in 2001-2002.

In the whole sample of 582 firms, there are 13 % (74 firms) of large firms and 87% of small firms, where the average total assets of Malaysian Ringgit 1.56million is set as the cutting point. Firm with total assets below 1.5million Ringgit is grouped as small firms and firm with total assets above 1.5million Ringgit is grouped as large firm. From Part (II), it shows that there are around 81% (around 4/5) of 582 firms have total assets below Ringgit Malaysia 1million. This indicates that Malaysia is characterized with small-medium size firms concentrated.

APPENDIX 10

Summary of Selected Sample by Industry Classification- Fiscal year analysis

The table presents the summary of industry classifications and the percentage of each industry category for 829 public listed firms in Bursa Malaysia relative to 109 firms of panel data used in this study. The category is made by referring to United State SIC Division Structure. The selected sample are then separated in size (as shown on the left column of this table) to indicate the percentage of each category for large versus small firms.

Industry	Industry Code	All Public listed firms		Mandatory Adopters		By Size: Industry Code	Large		Small	
		No. of firms	%	No. of firms	%		No. of firms	%	No. of firms	%
Agriculture, Forestry & Fishing	1	33	4%	7	6%	1	2	7%	3	5%
Mining	2	6	1%	0	0%	2	0	0%	0	0%
Construction	3	63	8%	6	6%	3	2	7%	3	5%
Manufacturing	4	393	47%	53	46%	4	8	27%	31	56%
Transportation	5	49	6%	6	7%	5	4	13%	2	4%
Wholesales	6	27	3%	3	2%	6	1	3%	1	2%
Retail / Trade	7	45	5%	4	4%	7	3	10%	0	0%
Finance, Insurance & Real Estate	8	144	17%	25	25%	8	9	30%	12	22%
Services	9	62	7%	5	5%	9	1	3%	3	6%
Public Administration	10	7	1%	0	0	10	0	0%	0	0%
No. of Firms	TOTAL	<u>829</u>		<u>85</u>		TOTAL	<u>30</u>		<u>55</u>	

Zero percent for mining. Retail/trade is normally large firms and they form almost 4% of firms in market.

APPENDIX 11

Summary of Selected Sample by Industry Classification- Calendar year analysis

The table presents the summary of industry classifications and the percentage of each industry category for 829 public listed firms in Bursa Malaysia relative to 109 firms of panel data used in this study. The category is made by referring to United State SIC Division Structure. The selected sample are then separated in size (as shown on the left column of this table) to indicate the percentage of each category for large versus small firms.

Industry	Industry Code	All Public listed firms		Mandatory Adopters		By Size: Industry Code	Large No. of firms	% No. of firms	Small No. of firms	% No. of firms
		No. of firms	%	No. of firms	%					
Agriculture, Forestry & Fishing	1	33	4%	7	6%	1	2	6%	5	6%
Mining	2	6	1%	0	0%	2	0	0%	0	0%
Construction	3	63	8%	6	6%	3	2	6%	4	5%
Manufacturing	4	393	47%	53	49%	4	8	26%	45	58%
Transportation	5	49	6%	6	6%	5	4	13%	2	3%
Wholesales	6	27	3%	3	3%	6	1	3%	2	3%
Retail / Trade	7	45	5%	4	4%	7	3	10%	1	1%
Finance, Insurance & Real Estate	8	144	17%	25	23%	8	10	32%	15	19%
Services	9	62	7%	5	5%	9	1	3%	4	5%
Public Administration	10	7	1%	0	0	10	0	0%	0	0%
No. of Firms	TOTAL	<u><u>829</u></u>		<u><u>109</u></u>		TOTAL	<u><u>31</u></u>		<u><u>78</u></u>	

APPENDIX 12

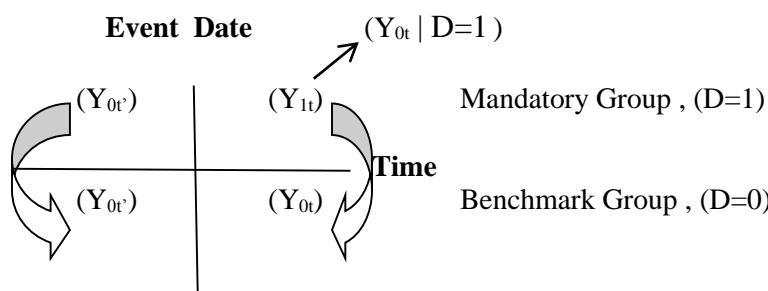
Heckman's Difference-in-differences Model with PSM (Model in Detail)

(I) *The Mechanism of Difference-in-differences Approach*

The matching estimators computed from DID model indicate the significant difference of changes in information content and timeliness (CICT) on mandatory adopters due to the legal reform to IRF. In this case, I benchmark the differences of these CICT for MA group against EA group. The outcome variable of CICT is named Y in the Figure 9 as shown below. In addition, it is also a condition that DID method required panel data (longitudinal data) for the comparison group, the treated (MA) and untreated (EA) groups. The panel data accounts for data falls within two time-points (t and t') for the period before and after the legal reform to IRF.

Following the DID methodology of Heckman, the net effect of legal treatment on outcome Y is the difference between the outcome variable Y at time t after legal treatment, $(Y_{1t} | D=1)$ and the outcome variable Y at time t where the firms are not treated, $(Y_{0t} | D=1)$. Figure 9 on the next page shows the picture of this difference. In summary, it can be computed as $E(Y_{1t} - Y_{0t} | D=1)$. In this study, Y, the outcome variable is the changes of information content and timeliness of firm i. $D=1$ represents the mandatory (treated) group, $D=0$ is for the benchmark (untreated) group.

Figure 9: Heckman's Difference-in-differences Model (Heckman et al., 1997, 1998)



$$\Rightarrow \text{Heckman's model: } \Delta_{\text{DID}}(X) = E(Y_1 - Y_0 | D=1, P(X)) \quad \text{equation (3)}$$

Since it is not possible to measure $(Y_{0t} | D=1)$, the assumption is made where the outcome variable Y of benchmark group (untreated) at time t , $(Y_{0t} | D=0)$ can be used to substitute the group should the firms are not treated at time t ($Y_{0t} | D=1$), by matching on the conditional firm characteristics ($P(X)$) of the benchmark group to the mandatory group (treated) at time t . Hence, two assumptions have been derived from this concept where,

$$\text{Assumption 1: } (Y_{0t} | P(X), D=1) = (Y_{0t} | P(X), D=0).$$

$$\text{Assumption 2: } 0 < \Pr(D=1|X) < 1$$

When substituting $(Y_{0t} | P(X), D=1)$ by $(Y_{0t} | P(X), D=0)$ into the original equation of $\Delta_{\text{DID}}(X) = E(Y_1 - Y_0 | D=1, P(X))$, the treatment effect on treated ($\Delta_{D=1}$) when accounting for time effect can be estimated by,

$$\begin{aligned} \Delta_{\text{DID}}(X) &= n^{-1} \sum_{D=1} [Y_{1ti}(X_i) - E(Y_{0ti} | P(X_i), D_i=0)] \\ &\quad - n^{-1} \sum_{j=1} [Y_{0tj}(X_j) - E(Y_{0tj} | P(X_j), D_j=0)] \end{aligned} \quad \text{equation (4)}$$

Time Effect

Panel Data (Longitudinal data) are used to measure the differences between the treatment effect on CICT of the treated firms (MA) and the weighted average differences in treatment effect on CICT of the untreated firms (EA) (Heckman et al., 1997, 1998). In this DID analysis for two-time-points, I first create a changes-score variable, which is derived from three-days buy-and-hold returns for windows regressed with annual returns, for the differences of information content and timeliness between pre-legal reform (at time t') and post-legal reform period (at time

t). A significant coefficient of CICT for MA at the post-legal reform period is expected for an effective legal reform to increase reporting frequency (IRF).

$$\text{ATT}_{\text{DID}} = 1/n_1 \sum_{i \in II \cap Sp} [(Y_{1ti} - Y_{0t'i}) - \sum_{j \in I0 \cap Sp} W(i, j) (Y_{0tj} - Y_{0t'j})] \quad \text{equation(6)}$$

In Heckman's DID, the change of information content and timeliness (CICT) is proxied by the association between the Annual (buy-and-hold) Returns and earnings announcement returns (window returns, WR), which is the beta coefficient (β_i) derived from the equation below:

$$\text{Annual Returns}_{it} = \alpha + \beta_i \text{WR}_{itq} + e \quad \text{equation (7)}$$

Where, i refers to the firms selected in the sample set, t refers to year (time) and j refers to the four-quarter, where q= quarter 1, 2, 3 and 4.

The annual returns and window returns are computed from buy-and-hold return BHR:

$$R_{it} = [\prod (1 + r_{i,t})] - 1$$

WR_{itq} accounts for each quarter's EAD returns over a year for firm $i=1,2,3\dots$.

Thus, the model of equation (7) is used to measure the relationship between firms' annual returns and each quarter returns over the test period. The relationship between the annual returns and quarter returns (β_i) is expected to strengthen due to more timely and confirmative information available after the increased of reporting frequency. This β_i has been used as an outcome variable (Y) of this study to proxy the effectiveness of legal reform to IRF on information environment, which is also named CICT.

The Difference-in-differences of CICT for the mandatory adopters of higher reporting frequency can be presented in the regression equation (on the next page), but it is not as efficient as the Heckman's DID. This regression approach of DID has been set as an alternative method to the main analysis of this study. (The equation below is explained on page 138, equation 10),

$$\text{CICT}_{\text{DID}} = \delta_0 + \beta_0 \text{ POST} + \delta_1 \text{ MA} + \beta_1 \text{ POST*MA} + \nu_2 \quad \text{equation (10)}$$

Where,

POST is a variable of reporting regime period for pre- and post-legal reform. Assign 1 to post, zero otherwise. POST*MA is an interaction term, which the estimated coefficient (β_1) represents the Difference-in-differences (DID) of outcome variable, $E [Y_{1t} - Y_{0t} | D=1]$.

In summary, the Difference-in-differences (DID) matching estimators accounted for the time-invariance of CICT outcomes in between the treated group and untreated group (Heckman, Ichimura, Smith, & Todd, 1998; Heckman et al., 1997; Heckman, Ichimura, & Todd, 1998).

(II) *Propensity Scores*

The DID analysis uses logistic regression to estimate the conditional probabilities (propensity score) of MA group, later denotes as $P(X)$. According to Bayes' Theorem, knowing that the conditional probabilities of firm characteristics may influence the corporate decision in voluntary adopting higher reporting frequency, I should reassess the effects of legal reform to four-quarterly reporting on the information content and timeliness of mandatory adopters, MA

(Gujarati & Porter, 2010, Fourth Edition). The conditional probabilities of characteristics are also named propensity scores⁴⁹, ($P(X)$).

Heckman's DID analysis aims to identify the mean effect of treatment on the treated firms (ATT) with characteristic Xs. The propensity score is therefore used to measure the probability of a firm being assigned to a particular treatment (e.g. policy changes) given a set of observed characteristics, $P(X)$, (Heckman et al., 1997; Heckman, Ichimura, & Todd, 1998). The objective of using propensity score is to reduce the selection bias by controlling the characteristics (Xs) of firms, such as size and agency issues, matching the groups based on these covariates (Heckman, Ichimura, & Todd, 1998).

The parametric procedure (logit) is considered in estimating the propensity score ($P(X)$) of the MA group (the conditional outcome of $E(Y_{1t} | D=1, P(X))$) because the logistic regression method may reduce the dimension of the conditioning in matching problem to one-dimensional, non-parametric estimation problem, instead of k dimensional $E(Y_{1t} | D=1, X)$ (Heckman, Ichimura and Todd, 1997; Todd ,1999). The propensity scores calculated can be matched between the two groups of MA and EA using various techniques, i.e. the nearest neighbor, kernel regression and local linear regression, etc. (Todd, 1999). This study chooses to match the propensity scores with the kernel-based matching technique using kernel function of Epanechnikov. I also trim the sample by 1%, 2%, 5% and 10% for truncation⁵⁰ effect. The odds ratio is used since there is no

⁴⁹ Unlike IMR, which is normally used in a selection model, the propensity score can be used in both selection and matching models(Heckman & Todd, 2009).

⁵⁰ Truncation is a trimming process that discards extreme values, such as 10% of trimming may retain the observations fall within the 5th and 95th percentile. It has a similar effect to winsorising. Distinct from trimming, instead of excluding data, winsorization replaces the extreme values by certain percentiles, like set the bottom 5% to 5th percentile and top 5% to the 95th percentile (which means to replace the extreme values with the trimmed

weight but scores assigned to the firms in PSM. The limitations in the DID method are that this approach works on conditional probability (propensity scores) and the assumptions are made on estimates (Heckman et al., 1997; Heckman, Ichimura, & Todd, 1998).

minimum and maximum), so that the number of observations remained the same as before the winsorising. Both method of transformation limit the extreme values and reducing the effect of possibly spurious outliers.

APPENDIX 13

The Detail Application of Heckman's DID Model

There are two stages in the application of the Heckman's DID model: (1) calculate the propensity scores; (2) use propensity scores for kernel-based matching in order to obtain kernel estimator for DID analysis.

Stage one: Calculate Propensity Score with Logit Model

I use a Logistic regression (logit) model to generate the propensity scores, the conditional probabilities of characteristics, $P(X)$. Following Butler et al. (2007), in setting the choice-based (option) model with logit, two research questions are considered in tackling the treatment effects from higher reporting frequency:

- (1) What are the characteristics that explain the possibility of a firm voluntarily adopting quarterly reporting at the pre-legal reform period?

The characteristics identified (i.e. size and agency costs) are for firms which have adopted higher reporting frequency earlier and are not significantly influenced by the legal reform to IRF. There are other characteristics, such as ROA and ROE for performance variables, and information asymmetry. These are not considered due to factors that discussed at the end of this sub-section.

- (2) After accounting for the chance of early adoption (of quarterly reporting) voluntarily, what are the effects of practicing higher reporting frequency to those mandated adopters (MA) and the economy as a whole?

Thus, the choice-based model's equation for **Logit** is set as per below:

$$MA = \phi_0 + \phi_1 Z + v_2 \quad \text{equation (5)}$$

Where, MA is a dummy variable equal to one if firms are forced to switch to new reporting regimes, zero otherwise. Z is a vector of exogenous variables that representing factors used to explain the reasons of adopting higher reporting frequency. (Butler et al., 2007). MA is set to a function of size and agency costs.

Mandatory Adopters, $MA = f(\text{Size}, \text{Agency costs})$

General firm characteristics variables are not considered in this model setting in order to mitigate bias and deteriorating quality of the estimate outcome (Heckman et al., 1997). Therefore, only firm characteristics that may influence the corporate decision in voluntary adopting quarterly reporting are considered. The estimated propensity score is later applied in the second stage of regression.

Agency costs is considered because, obviously, a firm with a higher leverage level has a higher credit risk, may be required by bankers to report more frequently than a lower leverage firm. Therefore, higher leverage firm which is under institutional monitoring is more likely to voluntarily (early) adopting quarterly reporting (Butler et al., 2007), or report more frequently than lower leverage firm. Following Butler et al., (2007), agency costs measurement from Leftwich et al. (1981) is used in this study, which proxy for the benefit of institutional

monitoring by using the ratio total liabilities to firm value (Butler et al., 2007). Here, firm value refers to firm's net assets.

Size is related to voluntary adoption of higher reporting frequency and the tendency to disclose more information to public, but it is not related to the firm's annual return. The firms cross-listed in the U.S. are mainly large firms which practice higher reporting frequency. Larger firms normally voluntary disclose at higher reporting frequency as compared to the smaller public listed firms. This could be due to larger firms are higher in corporate transparency. Thus, shifting into quarterly reporting regimes causes fewer changes to their information environment. Size is measured by log total assets of firm for each financial year.

Size is also significantly correlated to mandatory adopters (MA), but no direct significant correlation noted with the changes in information content and timeliness. In addition, to assure exclusive restriction, v_1 , the error term from stage one Logit model (equation(5)) has been tested non-significant in the stage two regression of equation indicating no relation of error term, v_1 and v_2 from the stage two equation. Thus, the estimated coefficient for MA in equation (5) is without bias. In other words, size is a valid instrumental variable (IV). In the summary of descriptive statistics in Table 10 Part (b) of Pearson Correlation, it shows that Size and Agency costs are highly correlated. If this is applied to a selection model, the validity check on IV should resolve most of the possible concerns from appropriateness of IV selection raised by Lennox et al., (2012). In Heckman et al.'s (1997, 1998) DID model, the assumption of exclusion restriction refers to the Z vector of variables in the first model in stage one (equation (5)) being different from the variables used in the second model.

The information asymmetry variable is excluded because it is also a dependent variable of a higher reporting frequency (the effect), other than its characteristic that may influence the decision to voluntarily adopt higher reporting frequency (Butler et al., 2007). The increase in reporting frequency may reduce the firm-level information asymmetry, and hence lower the firm's idiosyncratic⁵¹ price return volatility. If I include the information asymmetry variable in stage one regression, this may result in endogeneity. Nevertheless, normality is assumed in the stage one analysis. Finally, the performance variables of ROA and ROS have been excluded because the results of analysis show that the ratios are highly volatile and not normal after transformations during the crisis period. These arguments are supported by the findings on performance analysis in Ooi and Visultanachoti (2005).

Stage Two: Kernel-based matching

Stage two is to apply the propensity score in the kernel-based matching to estimate the kernel estimator (counterfactual) for DID changes in information content and timeliness. Kernel-based matching (Heckman et al., 1997, 1998) involves matching all untreated (EA) with treated (MA) within a common support region. The estimator forms a weighted average by weighting the propensity score differentially, using weights $W(i,j)$. This weighted mean obtained from the method of non-parametric regression is used as a counterfactual, or kernel estimator.

In the application of Heckman's DID model with kernel-based matching on propensity score, the average treatment effect on MA (ATT) is:

⁵¹ Idiosyncratic return refers to unsystematic return.

$$\text{ATT}_{\text{DID}} = 1/n_1 \sum_{i \in I_1 \cap S_p} [(Y_{1ti} - Y_{0ti}) - \sum_{j \in I_0 \cap S_p} W(i, j) (Y_{0tj} - Y_{0t'j})] \quad \text{equation (6)⁵²}$$

where,

researchers may measure the difference-in-differences estimate of sample treatment effects for the Mandatory Adopters by taking the average of $(1/n_1) \sum_{i \in I_1 \cap S_p} \{ . \}$. It is assumed that each treated firm has a difference $(Y_{1ti} - Y_{0ti})$, and the multiple matches have average differences $\sum_{j \in I_0 \cap S_p} W(i, j) (Y_{0tj} - Y_{0t'j})$. These are used to compute the average change in information content and timeliness (CICT) that is the effect of the legal reform to IRF on MA, $i \in I_1$. (Guo & Fraser, 2010, Page 251).

The kernel estimator is a method of constructing the weighted mean for a focal point using various kernel functions (Guo & Fraser, 2010, page 253). During matching, the kernel matching estimator assigns a higher weight to closer distances between EA and MA, $|P(X_i) - P(X_j)|$, through the kernel function (Todd, 1999). I applied the Epanechnikov kernel function to the model, which has “a parabolic shape with support [-1,1] and the kernel is not differentiable at $z = \pm 1$ ” (Guo & Fraser, 2010, page 255). The Epanechnikov kernel is like a Gaussian (normal) kernel that has a finite support. Both are frequently used functions but the former is selected because its estimated density is smooth. Normally, non-parametric estimation requires subjective decisions on the bandwidth value specification, particularly for small sample sizes. (Guo & Fraser, 2010, page 45). Bandwidth is a smoothing parameter in non-parametric estimation. For large sample

⁵² This equation (6) is similar to the basic Heckman’s DID model as shown in Appendix 12:

$$\begin{aligned} \Delta_{\text{DID}}(X) = & n^{-1} \sum_{i=1}^n [Y_{1ti}(X_i) - E(Y_{0ti} | P(X_i), D_i=0)] \\ & - n^{-1} \sum_{j=1}^n [Y_{0tj}(X_j) - E(Y_{0tj} | P(X_j), D_j=0)] \end{aligned} \quad \text{equation (4)}$$

data, the consistency of the non-parameter estimator may require the bandwidth to shrink to zero. (Todd, 1999). Thus, in this analysis, this study uses a large bandwidth⁵³ value of 0.6 and 0.8 (by default) instead of a small one since I have a small sample. This is to ensure that at least 80 % of the total observations centering on the focal point fall into the span (Guo & Fraser, 2010, page 263).

Bootstrapping

For non-parametric⁵⁴ regression analysis, bootstrapping⁵⁵ is used to estimate standard errors for difference-in-differences. Next, the estimated standard errors are further used to estimate a 95% bootstrap confidence interval for the ATTs (Guo and Fraser, 2010, page 269). Bootstrapping is a resampling method. According to Wooldridge (2002), “Bootstrapping is a Monte Carlo simulation where the observed sample is treated as the population” (Wooldridge, 2002, page 378). Abadie and Imbens (2004) warn users on the complication and accuracy issues of bootstrapping. Nevertheless, bootstrapping is suitable for kernel-based matching provided that it is practiced with caution. However, this may not be appropriate for other matching algorithms, such as the variant matching estimator by Abadia and Imbens (2002, 2006) (Guo and Fraser, 2010, page 269).

⁵³ In the scale of $Z_i = \lfloor (x_i - x_0)/h \rfloor$, this function is used to determine the distance between x value for the i th observation and the focal x_0 , and h is determined by the kernel function. Bandwidth (bw) is the fraction used to determine the number of observations fall in a span. (Guo & Fraser, 2010).

⁵⁴ Both the kernel-based matching and local linear regression are non-parametric regression.

⁵⁵ Bootstrapping is normally used to generate standard errors, confidence interval and p value for test statistic. (Wooldridge, 2002, page 378)

Trimming Strategy

Due to the fact that the estimation of the treatment effects for the treated sample using kernel-based matching is not efficient but robust, a different trimming specification is necessary. In this study, different trimming specifications at 1%, 2%, 5% and 10% level of the study observations are set for trimming at the two ends of the common support region. This sensitivity analysis helps to discard the non-parametric regression results in regions where the propensity score for EA (non-treated) are sparse. It aims to curb any omission of important variables and measurement error in the covariates. (Guo & Fraser, 2010, page 251).

Assumptions

Following the framework for propensity scoring developed by Rosenbaum and Rubin in 1983, Heckman et al. (1997, 1998) further develop the DID model for evaluation of training program participants. In fact, Heckman and colleagues improved on the few strong and restrictive assumptions of Rosenbaum and Rubin (1983) by making these assumptions more general than before. First, Heckman et al. (1998) claimed that assuming both the outcome variable for treated and untreated to be independent of treatment assignment conditional on observed covariates $[(Y_0, Y_1) \perp D | X]$ (Rosenbaum & Rubin, 1983) is in fact ‘strongly ignorable treatment assignment’. In Heckman et al.’s framework, they require a weaker condition by only requiring the outcome variable for the untreated to be independent $[(Y_0) \perp D | X]$. (Heckman et al., 1997, 1998).

Second, Heckman et al. (1998) imposed mean independence $[E(Y_0 | D=1, X) = E(Y_1 | D=0, X)]$ instead of full independence (Rosenbaum & Rubin, 1983). This means, if this assumption is applied to the study, conditional on covariates, the mean of CICT (Y_0) under EA when being

used as a substitute in the treated case, has to be equivalent to the mean of CICT (Y_1) under MA should they being non-treated, for the control purposes.

Third, Heckman's framework requires the researcher to separate the observable and unobservable variables. This requirement may allow specification of parameters that do not depend on unobservable variables. Under the assumption of exclusion restriction, researchers are required to identify a few different variables, so that the variables selected to determine the outcome variable (X variables) and variables selected to determine the treated group (Z variables) do not comprise exactly the same variables. They assume that the 'propensity score based on X variables (i.e. $P(x)$) equals the propensity score based on treatment (i.e. $P(z)$), which means $P(x) = P(z)$ '. Heckman's framework requires that once the data are conditional on $P(z)$, the distribution of unobservable are the same for both treated and untreated. (Guo & Fraser, 2010, page 247).

Even though the selection model application is getting popular in the accounting literature in recent years, Lennox et al. (2012) raised this key concern of lack of exclusion restrictions (or instrument variable, IV) applied for the estimates derived from Heckman's models. Also, some IVs may be selected on an ad hoc basis and may not be valid (Lennox, Francis, & Wang, 2011). If the research cannot identify a valid IV, it is better to choose to work on simple OLS regression instead of the selection model to avoid severe bias and no correction of endogeneity because of the poor quality of the IV estimate (Larcker and Rusticus, 2010). This is however not the key issue for this study because the IV in this study has been justified as valid (see Appendix 8). The size variable in the choice-based model of this is study is tested as a valid IV.

Advantages over other matching estimators

Kernel-based matching has a few advantages over other matching algorithms. It runs matches using all observations, and thus is more informative than other methods. It is also more effective since it assigns a higher weight to the closer matcher and lower weight to distal observations. (Guo & Fraser, 2010, page 246). Abadie & Imbens (2002, 2006) present the variance matching estimator and they do not employ additional non-parametric estimation, bandwidth or smoothing parameters. Hence, Abadie & Imbens's (2002, 2006) method is used as an alternative treatment effect analysis for a comparison to the main analysis of Heckman's DID model in the first robustness test. Lastly, the DID method is more robust in handling measurement errors and eliminating bias than other methods. (Guo & Fraser, 2010, page 273).

THE END