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QUARTERLY VERSUS SEMIANNUAL: THREE ESSAYS ON ASSESSING THE IMPACT OF REPORTING FREQUENCY ON CAPITAL MARKETS

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by

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To: Dean William Hardin
College of Business

This dissertation, written by S M Mahamudul Islam, and entitled Quarterly versus Semiannual: Three Essays on Assessing the Impact of Reporting Frequency on Capital Markets, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Florida International University, 2023

DEDICATION

I dedicate this work, "Quarterly versus Semiannual: Three Essays on Assessing the Impact of Reporting Frequency on Capital Markets", to the amazing people who guided and supported me on this challenging journey. This includes my loving mother, Hosne Ara Begum, who taught me to dream big and work hard to achieve those dreams, and my steadfast father, Mazadul Islam. Their constant support and aspirations for me have fueled my journey and ambition. I am also grateful to my sister, Mila, and brother-in-law, Rashed, who always supported me, pushing me to aim high. Yet the heart of my journey, the cornerstone of my resilience, is my wife, Leana. Without her constant belief in me and endless support, this work would remain just a dream. Her presence in my life gives me the strength to accomplish what seems impossible.

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ABSTRACT OF THE DISSERTATION

QUARTERLY VERSUS SEMIANNUAL: THREE ESSAYS ON ASSESSING THE IMPACT OF REPORTING FREQUENCY ON CAPITAL MARKETS

by

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Florida International University, 2023

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Professor Clark Wheatley, Major Professor

This dissertation presents a trilogy of independent, but interrelated essays that focus on the capital market effects of mandatory semiannual reporting using a recent change in reporting frequency in the United Kingdom. This research critically evaluates the contentious issue of optimal reporting frequency, leveraging the unique U.K. setting with data drawn from annual, semiannual, and quarterly reports.

In Essay 1, "Financial Reporting Quality: Does Reporting Frequency Matter?", I examine the relationship between reporting frequency and financial reporting quality. Through comprehensive quantitative analysis, it is revealed that semiannual reporting is associated with higher accruals quality, reduced accruals manipulation, improved earnings persistence, and increased earnings smoothness compared to quarterly reporting. The results challenge existing beliefs by demonstrating an incremental improvement in financial reporting quality associated with less frequent reporting, and call for a reevaluation of existing reporting policies.

In Essay 2, "The Impact of Reporting Frequency on The Cost of Debt, Equity, and Operations", I investigate the consequences of reporting frequency on firms' cost structures. This analysis indicates that less frequent reporting leads to increased cost of debt, cost of equity, and operational costs. The research not only uncovers the financial and operational repercussions of less frequent reporting, but it also provides valuable insights for managerial decision-making and investor risk perception.

Essay 3, "Reporting Frequency Dynamics: Shaping Capital Allocation and Information Asymmetry", scrutinizes the impact of reporting frequency on capital allocation and information asymmetry. The evidence indicates that less frequent reporting prompts an increase in capital expenditure and fixed asset investment, countering short-termism. Contrary to the conventional belief, this study finds a decrease in information asymmetry following reductions in reporting frequency, and supports the contention that less frequent reporting facilitates long-term profitability focus.

Collectively, these essays provide a comprehensive examination of the multifaceted effects of reporting frequency, contributing substantial insights to accounting literature and praxis. By challenging existing assumptions, this dissertation not only stimulates further academic discourse but also offers valuable insights to regulators, policymakers, and market participants. It ultimately enriches our understanding of financial reporting dynamics, enhancing market integrity and economic stability.

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INTRODUCTION

The question of the optimal frequency for financial reporting remains a contentious issue among academics, regulators, and capital market participants. The call for less frequent reporting has been gathering momentum among institutions and political organizations, underlining the relevance, urgency, and significance of this research (Isidore and Alesci 2018; Bloomberg 2018; Banham 2018). As the SEC grapples with the decision to transition from quarterly to semi-annual reporting or to alleviate the burden of reporting by permitting more qualitative disclosures, it illuminates the necessity for rigorous empirical research to weigh the inherent trade-offs (SEC 2016). This comes amid increasing concerns about the implications of frequent reporting on corporate short-term thinking and fostering an environment conducive to earnings manipulation by managers aiming to satisfy short-term financial targets (Pozen et al. 2015; Lipton et al. 2015). The challenges of quantifying the consequences of more frequent reporting amplify the need for a rigorous investigation into this matter. To contribute to this phenomenon, this dissertation presents three comprehensive essays that systematically explore the capital market effects of mandatory semiannual reporting in the United Kingdom. Together, these essays aim to shed light on the complexities of financial reporting frequency, challenging prevailing assumptions and offering empirical insights into the consequences of such shifts.

In the first essay, I investigate the impact of reporting frequency on financial reporting quality, a critical topic that remains underexplored in existing accounting literature. The study draws on annual, quarterly, and semiannual data from UK firms, conducting an exhaustive quantitative analysis to reveal a nuanced relationship between these two factors. Findings indicate that semiannual reporting is associated with higher

accruals quality, reduced accruals manipulation, improved earnings persistence, and increased earnings smoothness compared to quarterly reporting. Less frequent reporting also appears to lead to an incremental improvement in financial reporting quality, challenging conventional beliefs that more frequent reporting necessarily enhances quality. These results contribute substantially to the academic discourse, questioning existing assumptions and encouraging further investigation into the optimal frequency of financial reporting. The implications for regulators and policy-makers are particularly significant, suggesting a potential need for reevaluation of current reporting requirements. Moreover, the findings offer valuable insights for companies and investors, emphasizing the role of reporting frequency in facilitating high-quality, reliable financial information. By addressing a notable knowledge gap in accounting research, this study provides a firm foundation for future investigations into the complex dynamics of financial reporting and its implications for market integrity and economic stability.

The second essay of my dissertation meticulously explores the cost consequences tied to the frequency of financial reporting by leveraging the natural experiment occasioned by the change in U.K. reporting frequency. A difference-in-differences and pre/post analyses are used to assess the effect of a mandatory shift to semiannual reporting on the cost of debt, cost of equity, and operating costs. The results indicate that less frequent reporting leads to a significant increase in the cost of debt, suggesting that creditors perceive companies reporting on a semiannual basis as riskier than those reporting quarterly. The findings also demonstrate that a mandatory switch to less frequent reporting increases the cost of equity, as evidenced by the significant incremental decrease in the earnings-to-price ratio and return on equity across various data types. Additionally, less frequent reporting

is associated with increased operating costs, implying that firms mandatorily switched from quarterly to semiannual reporting experience higher operating expenses as a proportion of total sales or average total assets. This research highlights the potential negative consequences of less frequent financial reporting on firms' borrowing costs, equity valuation, and operational efficiency and contributes to the understanding of the trade-offs between reporting frequency and its associated costs. This paper is of significant value as it supports managers, investors, and policymakers in better understanding the implications of reporting frequency on the cost structure of firms and the perceived risks by investors. It underscores the need for a careful, nuanced approach to setting reporting standards that considers the broad financial and operational implications for firms and the broader market.

The third essay scrutinizes the impact of reporting frequency on managerial capital allocation decisions and information asymmetry, using UK data. By applying the Difference-in-Differences method and a pre/post approach, the study finds a significant increase in capital expenditures and fixed asset investments are associated with a mandatory shift from quarterly quantitative to semiannual reporting. This result supports theories that less frequent reporting allows managers to focus more on long-term profitability, thereby discouraging short-termism. Contrary to the conventional belief that increased reporting frequency reduces information asymmetry, I find a significant decrease in bid-ask spread and information asymmetry following reductions in reporting frequency. This suggests that the value and novelty of the information presented are critical factors in determining the impact of reporting frequency on information asymmetry. Thus, my results dispute the prevailing assumption that a higher frequency of reporting invariably reduces information asymmetry, and supports the notion that frequent, but uninformative reporting

can lead to information overload and market misperceptions. This research has implications for both regulatory and organizational decision-making by providing valuable insights for policy debates on: financial reporting frequency; re-evaluating the impact of frequency on managerial decision making; and information asymmetry.

The findings reported in this dissertation represent extensive, yet preliminary research into the effects of financial reporting frequency on various aspects of financial reporting quality, costs, and managerial capital allocation decisions. These essays aim to provide meaningful insights and contribute to the ongoing discourse around the frequency of financial reporting, a topic of significant relevance for academics, regulators, and market participants. It is imperative to recognize that the results derived from this research are based on an array of detailed tests and a unique model incorporating a variety of variables deemed comprehensive at the time of writing.

It is acknowledged that the inclusion of additional variables, yet unaccounted for, may potentially lead to different outcomes. The analyses conducted in these essays rely heavily on historical and cross-sectional data from firms in the United Kingdom. Therefore, generalizing the findings to other regulatory environments, jurisdictions, or industries should be done with caution, as reporting requirements and the broader financial landscape may differ significantly. Furthermore, the complexity of the topic at hand necessitates an open-minded approach to further research and debate. As new data becomes available and more robust tests and models are applied, the results reported here may evolve. Thus, while the results in these essays provide a valuable contribution to the understanding of the effects of financial reporting frequency, they should be seen as part of an ongoing conversation rather than as definitive conclusions.

ESSAY 1: FINANCIAL REPORTING QUALITY: DOES REPORTING FREQUENCY MATTER?

I. INTRODUCTION

The temporal interval of financial reporting—whether annual, semiannual, or quarterly—can significantly impact the quality of the disseminated information. Lately, there's been a surge in discussions concerning the most beneficial frequency for reporting. A segment of these discussions suggests that an uptick in reporting frequency, for example, quarterly, could inadvertently foster short-termism and potentially stimulate opportunistic earnings manipulation by managers. Consequently, there has been increasing support from institutions and political organizations for less frequent reporting (Isidore and Alesci 2018; Bloomberg 2018; Banham 2018)[1]. It is still unclear, however, what the optimal reporting frequency should be to ensure maximum benefits for market participants.

An important consideration when evaluating reporting frequency is the quality of financial reporting. Financial reporting is primarily intended to provide high-quality financial data that meets the needs of all stakeholders (SEC Statement 2022). An efficient market requires high-quality financial reporting so stakeholders can make well-informed investment, credit, and resource allocation decisions (IFRS 2015). Upholding the integrity and stability of the financial system hinges on the accuracy and reliability of financial reporting, which in turn delivers significant benefits to investors and other users (Nwaobia, Kwarbai, Jayeoba, and Ajibade 2016). I would like to stress the gravity of a marked decline

[1] The former CEO of Ford, GM, and Chrysler, Bob Lutz, called for the discontinuation of quarterly reporting (Pisani 2018). According to former Pepsi CEO Indra Nooyi, earnings should be reported semiannually instead of quarterly (Isidore and Alesci 2018). During his presidency, President Barack Obama advocated eliminating quarterly earnings updates (Isidore and Alesci 2018), and President Donald J. Trump also called for the elimination of quarterly earnings updates (Banham 2018).

in financial reporting quality on our financial system. The essence of a thriving economy lies in the trustworthiness of financial disclosures. If deemed unreliable, it could discourage stakeholders, like investors and creditors, from investing. This reluctance could then amplify, leading to a potential market collapse. So, we must proactively maintain high-quality financial reporting standards to ensure economic stability. It is, therefore, crucial to examine whether alterations in reporting frequency have a substantial impact on reporting quality. Despite the significance of this subject matter, existing research is notably sparse. This study aims to address this deficiency by investigating how reporting frequency affects financial reporting quality.

There is no straightforward relationship between reporting frequency and reporting quality. On the one hand, increased reporting frequency, such as quarterly reporting, can potentially elevate a firm's reporting quality by offering more timely information to investors and other stakeholders, thereby facilitating better investment decisions. More frequent reporting may also prompt firms to maintain more accurate and comprehensive records, thus enhancing reporting quality overall. Additionally, timely reporting enables a firm to swiftly identify and rectify any reporting discrepancies or errors, decreasing the probability of significant misstatements. However, in certain instances, frequent reporting might incentivize managers to employ aggressive accounting tactics to achieve financial targets due to heightened pressure to deliver positive results.

On the other hand, less frequent reporting can help firms circumvent issues related to information overload and short-termism (Kraft et al. 2018). By reporting at a lower frequency, firms can concentrate on delivering high-quality information that investors can utilize for making long-term decisions. A less frequent reporting schedule may also

contribute to improved reporting quality, as companies may be less inclined to engage in earnings management (EM) practices to avert negative surprises. Consequently, firms might perform better if financial information is prepared and disclosed at a lower frequency, as this approach conserves time and resources for other initiatives.

Recent changes in reporting frequency in the UK have created a unique research environment for examining the relationship between reporting frequency and reporting quality. This enables a deeper understanding of the factors influencing financial reporting quality and assists in making policy decisions. I use annual, quarterly, and semiannual data from UK firms in this study. Other studies have identified several factors that are directly linked to reporting quality and are often used to measure it. These include accruals quality, abnormal accruals, squared abnormal accruals, earnings persistence, earnings benchmarks, and earnings smoothness (Dechow, Ge, and Schrand 2010; Ewert and Wagenhofer 2011). My quantitative assessments of accruals quality indicate that compared to quarterly reporting, semiannual reporting is associated with a significantly higher quality of accruals. Regardless of whether semiannual, quarterly, or annual data are used, less frequent reporting leads to a significant incremental improvement in accruals quality. These results suggest that as companies move towards less frequent reporting, they may utilize the saved time and resources to improve the quality and transparency of their financial statements.

My tests of accruals manipulation show that less frequent reporting reduces absolute discretionary accruals regardless of the type of data used. Quarterly and semiannual data yield similar results for income-increasing discretionary accruals. Annual data, however, fail to detect differences between less frequent and more frequent reporting because the coefficients on income-increasing discretionary accruals become insignificant. The

coefficients of the main variables for annual data are also consistently smaller than the quarterly and semiannual coefficients. It may be difficult to distinguish differences in frequency when accumulated annually, and this may explain why the numbers become challenging to distinguish. Overall, the results suggest that less frequent reporting reduces accruals manipulation and improves reporting quality.

The results of earnings persistence tests demonstrate that semiannual reporting is associated with significantly higher earnings persistence than quarterly quantitative reporting. Moreover, less frequent reporting improves earnings persistence incrementally regardless of whether quarterly, semiannual, or annual data are used. It appears that less frequent reporting can result in more stable and predictable earnings and provide a more accurate picture of a firm's performance over a longer period. The results of earnings smoothness tests suggest that semiannual reporting significantly increases earnings smoothness compared to quarterly reporting. Using quarterly and semiannual data, the results also show that switching to semiannual reporting incrementally improves earnings smoothness and quality. When annual data are used, the coefficient of the interaction term becomes insignificant, perhaps due to the inherent limitations of annual compilations of information. Again, these findings suggest that less frequent reporting improves a firm's stability and sustainability of earnings as well as the quality of its management and operations. Reporting less frequently promotes smooth earnings, which can enhance the perception of earnings quality by enhancing investor confidence in a company's reported earnings.

This research is a substantial contribution to accounting literature, filling a significant knowledge gap and shedding light on the underexplored yet consequential link between

reporting frequency and financial reporting quality. The study offers a comprehensive and quantitative examination of accruals quality, earnings persistence, and earnings smoothness based on the frequency of reporting, thereby enriching the existing academic discourse. Contrary to the prevailing belief that more frequent reporting boosts quality, the findings of this research suggest that less frequent reporting can indeed enhance the quality of financial disclosures and reduce aggressive accounting tactics. This counterintuitive insight introduces a fresh perspective to the academic conversation and spurs further inquiries into the dynamics of reporting frequency and its broader implications. The policy implications of this study are notable. Evidence that less frequent reporting can lead to better quality disclosures should be a key consideration for regulators and policy-makers when formulating and revising disclosure requirements.

I believe that this investigation is the first to thoroughly assess reporting frequency using quarterly, semiannual, and annual data. Prior studies have analyzed data only at the annual level since it is challenging to obtain quarterly and semiannual data (Ernstberger et al. 2017; Kraft et al. 2018; Nallareddy et al. 2019; Hillegeist et al. 2020). Using annual data may mask differences in reporting quality that are more evident when analyzing quarterly and semiannual data. It is therefore questionable whether prior studies that relied solely on annual data are robust. By employing a more detailed dataset—such as the one derived from quarterly or semiannual reports—we can generate richer insights that elucidate the intricate relationship between reporting frequency and reporting quality. In support of this proposition, I demonstrate that many differences that are not apparent in annual data can be detected in quarterly and semiannual data.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Institutional Setting

To safeguard investors and streamline European capital markets, the European Commission crafted the Transparency Directive (TD). This directive, implemented in 2007, aimed to standardize capital market regulation across the EU by mandating quarterly Interim Management Statements (IMS). IMSs are required to include information on significant events and transactions that occurred during the period and their effect on the financial well-being of the firm and its controlled entities. The directive allowed for flexibility in the level of detail and content of the IMS, striving to promote the best practices for presenting material information. However, in 2014, the Financial Conduct Authority (FCA) proposed a consultation to eliminate firms' requirement to report quarterly IMSs. After obtaining UK and EU approval, this proposal was adopted into UK law in November 2015. It is worth noting that the FCA rules do not dictate the specific content of IMSs, such as the amount of quantitative information that should be reported (Nallareddy et al. 2019).

Related Literature on Reporting Quality

The literature regarding the association between reporting frequency and reporting quality is surprisingly lacking. Several studies on reporting quality have, however, examined and documented the advantages of higher-quality reporting, including its ability to reduce information risk and increase liquidity (Lambert, Leuz, and Verrecchia 2007). Brown and Hillegeist (2007), for instance, find a strong positive association between reporting quality and market reactions (e.g., an increase in investment volume). In addition, the quality of information presented in financial statements helps minimize asymmetric information anomalies resulting from parties with conflicting interests (Rajgopal and

Venkatachalam 2011) and is considered crucial to debt contracting (Costello and Wittenberg-Moerman 2011). With superior information, high-quality reporting also provides firms with a competitive advantage in the market (Jo and Kim 2007). Financial reporting that provides high-quality information also helps management make effective investment decisions and prevents the use of discretionary influence for personal gain (Chen, Hope, Li, and Wang 2011).

Related Literature on Financial Reporting Frequency

Surprisingly, no prior studies have directly investigated the relationship between reporting frequency and financial reporting quality. Researchers have, however, explored the effects in different directions. One stream of research looks at the impact of reporting frequency on information asymmetry, that is, the degree to which information is distributed unevenly among market participants (see Cuijpers and Peek 2010; Fu et al. 2012; Buskirk 2012; Kraft et al. 2018). Another stream of research focuses on examining how a change in reporting frequency affects the cost of equity, which is the cost of using equity financing (Hughes et al. 2007; Lambert et al. 2007; Fu et al. 2012; Shroff et al. 2017). Other research analyzes how reporting frequency affects information acquisition and spillover by investors, which refers to the effects of information on other firms or industries (*see* Drake et al. 2012; Rapach et al. 2013; Huang 2015; Arif and de George 2020). Finally, another steam of research investigates whether more frequent reporting leads to myopic investment decisions, a preference for short-term results over long-term profitability (*see* Ernstberger et al. 2017; Kraft et al. 2018; Nallareddy et al. 2019; Kajüter et al. 2019; Hillegeist et al. 2020).

Reporting Frequency and Firm's Reporting Quality

The association between reporting frequency and reporting quality is not straightforward. An increase in reporting frequency can notably enhance a company's reporting quality through a multitude of avenues. By providing stakeholders with more timely insights into a company's financial standing, they are equipped with the necessary information to make judicious investment decisions (Lambert et al. 2007; Brown and Hillegeist 2007). Moreover, frequent reporting can serve as a strong incentive for companies to uphold meticulous and accurate financial records, thereby laying the groundwork for reliable financial statements. The integrity of these financial reports is paramount to bolstering the overall quality of a firm's reporting. The adoption of more regular reporting may also facilitate earlier detection and correction of any discrepancies or misstatements, thus not only safeguarding against potential legal ramifications but also preserving a firm's reputation. In addition, a commitment to regular information dissemination sends a powerful message about a firm's dedication to transparency and accountability. In essence, a frequent reporting can significantly elevate a company's reporting quality by ensuring up-to-the-minute information for investors, fostering a culture of rigorous record-keeping, promptly addressing discrepancies, and promoting transparency and accountability.

However, we must also consider the potential merits of less frequent reporting. This approach might alleviate the relentless pressure to deliver short-term profitability, thereby promoting a healthier, long-term profitability focus (Bhojraj and Libby 2005; Kraft et al. 2018). Therefore, managers can invest in long-term projects such as research and development or capital expenditures without being pressured by short-term earnings

targets. It might also discourage managers from resorting to aggressive EM tactics to meet market expectations, thus potentially enhancing the veracity of reported results. The reduced reporting frequency not only economizes resources, time, and focus but also allows them to be redirected to core business activities such as operational efficiency, strategic planning, and innovation. Furthermore, it may alleviate time pressures, thereby minimizing the risk of errors and misstatements that might compromise the quality of financial reports. Given these divergent perspectives, it is challenging to predict unequivocally how changes in reporting frequency might impact reporting quality. I intend to explore this intricate issue further through the course of this research.

Accruals Quality and Accruals manipulation

The crucial role of accruals quality in determining financial reporting quality is fundamentally rooted in the relationship between past, present, and future cash flows (Kothari, Leone, and Wasley 2005). Accrual manipulation, a form of earnings management, significantly impacts the quality of financial reporting. When used excessively or maliciously, it can distort the company's true financial performance and position, undermining the faithfulness of representation. It can also reduce the predictive and confirmatory value of financial information, making it less useful for decision-making. Accruals quality and accruals manipulation are often considered measures of reporting quality in the accruals model (Healy and Wahlen 1999; Dechow and Dichev 2002). It is a widely accepted view that accrual quality and reporting quality share a positive relationship. In other words, an increase in the quality of accruals typically signals an increase in reporting quality (Dechow and Dichev 2002).

I posit that greater frequency in financial reporting can act as a deterrent to accruals manipulation and improve accruals quality. Regular access to high-quality financial information enables market participants to monitor a company's performance more effectively, leading to stock prices that reflect a broader set of information, thereby optimizing capital allocation and reducing information asymmetry between stakeholders (Yee 2004). In this context, managers may find fewer opportunities to manipulate earnings, while market participants can gain a clearer understanding of a company's risks and growth potential. Market participants who are better informed are more likely to spot financial misrepresentations and respond negatively to intentional distortions in financial data. This increased level of scrutiny serves to deter accruals manipulation and boost accruals quality, as firms become wary of the potential consequences. However, the pressures of short-term monitoring associated with more frequent reporting could encourage aggressive EM (Gigler et al. 2014) and selective disclosure of information (Brown, Hillegeist, and Lo 2009).

The advantages of less frequent reporting deserve consideration as well. Longer intervals between reports may discourage accruals manipulation since the immediate impact on reported performance would be less visible. A reduction in reporting frequency could also ease the pressure on companies to meet financial targets, thereby decreasing the motivation to manipulate accruals. Consequently, they can spend more time and resources improving their business performance instead of manipulating accruals. Given the contrasting implications of more frequent and less frequent reporting and lack of empirical evidence, it is difficult to forecast which approach will lead to better accruals quality. Both

perspectives offer compelling arguments, which makes it challenging to formulate clear-cut predictions. I thus present the following null hypotheses:

H1: Reporting frequency is not associated with accruals quality.

H2: Reporting frequency is not associated with accruals manipulation.

Earnings Persistence and Smoothness

In accounting literature, earnings persistence and earnings smoothness are two common metrics for measuring earnings quality and reporting quality (Francis et al. 2004; Dechow et al. 2010). Earnings persistence pertains to the degree of association between a company's earnings across multiple periods. Arguably, increased reporting frequency could potentially enhance earnings persistence. This, in turn, ensures a more predictable and steadier earnings pattern, providing a transparent snapshot of the company's financial health while mitigating earnings volatility. Such transparency facilitates improved financial planning, fosters expectation management, and enhances overall transparency – all pivotal aspects in solidifying earnings persistence. Yet, it is crucial to acknowledge the flip side: more frequent reporting might also engender increased market pressures, posing challenges in maintaining earnings persistence.

Intriguingly, less frequent financial reporting could also contribute to a more stable and predictable earnings pattern. It could decrease volatility and offer a longer-term view of the firm's financial health. This approach might enable investors to focus more on long-term trends, alleviating the pressure for companies to hit short-term earnings targets. Additionally, it could offer a path for companies to pare down their financial reporting and compliance costs, thereby bolstering financial stability and earnings persistence. Despite

these advantages, one cannot overlook the potential downside: less frequent reporting might reduce earnings persistence due to diminished transparency and heightened uncertainty about a company's financial performance. This can complicate future earnings predictions and provoke increased volatility.

The notion of earnings smoothness is another compelling consideration for reporting quality, shedding light on the stability and consistency of a company's earnings. A smoother earnings trajectory signifies superior earnings quality, mirroring the firm's operational and managerial excellence. Furthermore, smooth earnings can fortify investor trust in the accuracy and reliability of reported earnings, thereby amplifying the perceived earnings quality. Frequent reporting could potentially elevate earnings smoothness by decreasing earnings volatility, given the augmented scrutiny each reporting period would undergo. However, the mounting pressure to hit earnings targets and the amplified focus on short-term performance could escalate earnings volatility, thereby diminishing earnings smoothness. Contrarily, less frequent reporting might increase earnings smoothness, given the reduced scrutiny frequency and pressure to hit immediate earnings targets. This approach could yield a more stable and predictable earnings flow, proving beneficial for investors and stakeholders alike.

In sum, how reporting frequency impacts earnings persistence or smoothness remains an open question that warrant empirical support. I, therefore, propose the following null hypotheses, considering the contrarian conjectures discussed above:

H3: Reporting frequency is not associated with earnings persistence.

H4: Reporting frequency is not associated with earnings smoothness.

III. DATA AND METHODOLOGY

Sample Selection

I collect a sample of data from Compustat Global for all firms from 2007 to 2020. Data related to analysts' estimates are retrieved from the IBES international database. However, the empirical analyses are conducted on observations from 2008, as one year of lagged data is required to generate the complete set of variables used in the analyses. For quarterly and semiannual data, I ensure the accuracy of the data by manually coding the reporting frequency of each firm by examining the firm's posted financial statements and the Thomson Reuters Eikon database. To align with prior studies, I eliminate firm-period observations with SIC codes 4400-4999 and 6000-6999, representing regulated industries (e.g., banks and financial institutions with different reporting practices). Additionally, observations with assets below 1 million GBP are eliminated from my analysis to avoid outliers, as I use total assets as a scaler (Bryan and Mason 2020; Pacheco-Paredes and Wheatley 2021).

Determination of Reporting Frequency

Sample period 2015-2019

After 2014, companies that file earnings and sales numbers quarterly are designated as "voluntary quarterly reporters". These companies are expected to have quarterly IMSs in the *Thomson Reuters Eikon* database and varying sales or earnings numbers in the *Compustat Global* database (e.g., *period1* number differs from *period2*, and *period3* differs from *period4*).

Conversely, companies that report semiannually, either with quantitative or qualitative information, after 2014 are referred to as "mandatory semiannual reporters." These companies are expected to have semiannual IMSs in the *Thomson Reuters Eikon* database and matching *period1* and *period2* and (or) matching *period3* and *period4* earnings or sales numbers in the *Compustat Global* database.[23]

Sample period 2008-2014

Those firms that disclose earnings and sales (after 2007 but before 2014) at a quarterly frequency are designated as "mandatory quarterly quantitative reporters." These companies are expected to have quarterly IMSs in the *Thomson Reuters Eikon* database and varying earnings and sales numbers in the *Compustat Global* database (e.g., *period1* number differs from *period2*, and *period3* differs from *period4*). Additionally, companies that disclose quarterly qualitative information, regardless of earnings and sales numbers, are labeled as "mandatory quarterly qualitative reporters." These companies are expected to have quarterly IMSs in the *Thomson Reuters Eikon* database but identical *period1* and *period2* and (or) identical *period3* and *period4* sales or earnings numbers in the *Compustat Global* database.

[2] This is because for semi-annual or qualitative reporters, the database simply assigns half of the semi-annual number to each of the quarters making up the semiannual period.

[3] Following the quarterly interim management statement (IMS) introduction in 2007, certain firms only disclosed quarterly qualitative data without accompanying financial metrics. Essentially, they released qualitative details for the first and third quarters, but quantitative data only in the second and fourth quarters, aligning more closely with semiannual than quarterly reporting. However, previous studies mistakenly categorized these firms as quarterly reporters (see Rahman et al. 2013; Ernstberger et al. 2017; Nallareddy et al. 2019; Hillegeist et al. 2020). In response, this study more accurately contrasts quantitative quarterly reporters with mandatory semiannual reporters, excluding the qualitative quarterly reporters. Furthermore, I compare quantitative quarterly reporters to all semiannual reporters, correctly classifying qualitative quarterly reporters as semiannual reporters.

Specification of Controls

Consistent with prior research, I control for various firm-specific characteristics that may affect the relationship between reporting frequency and reporting quality. To account for size differences, I include the variable *SIZE*, which is the natural log of the firm's beginning-of-period total assets. Additionally, as growth firms may respond differently to earnings targets and adopt various strategies based on their reporting frequency, I control for growth using the variable *GROWTH*, which is the change in sales scaled by beginning-of-period total assets. To account for measurement errors, I use the variable *ROA*, net income scaled by beginning-of-period total assets, as suggested by Dechow et al. (1998), to control for measurement errors. Furthermore, as UK firms that are cross-listed in the US may have incentives to report quarterly even when only semiannual reporting is mandated, I control for cross-listing using the variable *ADR*, which is an indicator variable that is equal to 1 if the UK firm is cross-listed in the US, and 0 otherwise.

Additionally, the ability of a firm to meet its financial obligations may impact the frequency of reporting and quality of financial reporting, so I include the variable *LEV* (total liabilities divided by total assets) to control for a firm's financial flexibility. Furthermore, I also include a set of indicator variables for industries (i.e., *Industry FE*) derived from the first two digits of the Standard Industrial Classification (SIC) code to account for fixed effects specific to a given industry that may affect the relationship between reporting frequency and reporting quality. To control for variations in economic conditions, I also include fixed effects for each year in the sample period (i.e., *Year FE*).

Variable Definitions

Accruals Quality Measures

As a proxy of accruals quality (*AQ*), I use the modified Dechow and Dichev (2002) accruals quality model used in McNichols (2002). This model separates accruals into different components based on their relationship with cash flows and regresses working capital accruals on the current period, the prior period, and the future period CFOs, and the change in revenues and PP&E. *AQ* is estimated for firm *i* in two-digit SIC code *j* in period *t* (with at least 15 observations) using the residual from the following cross-sectional regressions:

$$TCA_t / AA_t = \alpha_0 + \alpha_1(CFO_{t-1}/ AA_t) + \alpha_2(CFO_t/ AA_t) + \alpha_3(CFO_{t+1}/ AA_t) + \alpha_4 (\Delta REV_t / AA_t) + \alpha_5(PPE_t / AA_t) + \varepsilon_t \quad (1)$$

Where:

TCA_t = total current accruals in period *t* = Change in current assets – Change in current liabilities – Change in cash + Change in debt in current liabilities

AA_t = Average total assets in period *t* and *t-1*;

ΔREV_t = Change in revenues from period *t-1* to period *t*; and

PPE_t = Net property, plant, and equipment in period *t*.

The estimation of eq. (1) produces a series of residuals that are specific to each firm and period. These residuals form the basis for the accruals quality measure, $AQ = \sigma(\hat{\nu}_t)$. So, *AQ* represents the standard deviation of the estimated residuals for each firm and each period. There is a positive association between the quality of accruals and the quality of financial reporting (Kothari et al. 2005). So, I multiply the variable *AQ* by –1 to make the association between variable *AQ* and accruals quality positive. Thus, as *AQ* values increase (decrease), accruals quality is expected to improve (decrease). In *AQ3*, standard deviations

of the estimated residuals are calculated using a rolling three-year window, while in *AQ5*, standard deviations of the estimated residuals are calculated using a rolling five-year window (Francis et al. 2004; Dechow et al. 2010).

Accruals Manipulation Measures

As a proxy for accruals manipulation, I employ the modified Jones model (Dechow et al. 1995) with a constant term to calculate discretionary accruals (*DACC*). *DACC* is estimated for firm *i* in two-digit SIC code *j* in period *t* with at least 15 observations using the residual from the following cross-sectional regressions:

$$TA_t / A_{t-1} = \alpha_0 + \alpha_1(1/ A_{t-1}) + \alpha_2[(\Delta REV_t - \Delta REC_t)/ A_{t-1}] + \alpha_3(PPE_t / A_{t-1}) + \varepsilon_t \quad (2)$$

Where:

TA_t = total accruals in period t = Change in current assets – Change in current liabilities – Change in cash + Change in debt in current liabilities – Depreciation and amortization

A_{t-1} = Total assets in period *t-1*;

ΔREV_t = Change in revenues from period *t-1* to period *t*;

ΔREC_t = Change in receivables from period *t-1* to period *t*; and

PPE_t = Net property, plant, and equipment in period *t*.

DACC measures the abnormal discretionary accruals, which is the difference between actual and "normal" accruals for each firm-period. I then use the absolute value of *DACC* (*ABSDACC*) and income-increasing or positive *DACC* (*IIDACC*) as proxies for accruals manipulation. Accruals manipulation and reporting quality are inversely proportional, and, generally, higher accruals result in lower reporting quality (Dechow and Dichev, 2002). So, a significant increase in discretionary accruals (both *ABSDACC* and *IIDACC*) is

detrimental to reporting quality. It is, therefore, reasonable to expect that, as the values of *ABSDACC* and *IIDACC* increase (decrease), reporting quality will deteriorate (improve).

Earnings Persistence and Smoothness Measures

$$Earnings_{t+1} = \alpha + \beta\ Earnings_t + \varepsilon_t \quad (3)$$

Where:

PERSIST = β, which indicates earnings persistence (Francis et al. 2004; Dechow et al. 2010). Accordingly, higher (lower) *PERSIST* indicates more (less) persistent earnings. More persistent earnings will result in a more sustainable earnings/cash flow stream, therefore, better financial reporting.

$$SMOOTH = \sigma(Earnings)/\ \sigma(CFO) \quad (4)$$

Where:

SMOOTH indicates earnings smoothness. *SMOOTH* is measured by dividing the standard deviation of earnings before extraordinary items (scaled by assets) by the standard deviation of cash flows from operations (scaled by assets) (Francis et al. 2004; Dechow et al. 2010). A rolling five-year (five-period) window is used to calculate standard deviations. As configured in eq. 4, a greater value of *SMOOTH* indicates less smoothness in earnings. I thus multiply the variable *SMOOTH* by –1 to make the association between *SMOOTH* and earnings smoothness positive (i.e., a higher value of *SMOOTH* indicates improved smoothness of earnings).

Model Estimates

I measure *H1-H4* using a difference-in-differences (DiD) approach and a base model to examine the impact of the reporting frequency shift on firms' reporting quality. In the DiD approach, the treatment group consists of firms that mandatorily began reporting semiannually following the rule change (post-period) from quarterly quantitative reporting in 2015. The control group is comprised of firms that report quarterly quantitatively during the entire sample period. To test *H1-H4*, I estimate the following two models using robust regressions:

$$\textbf{Model 1: } RQ = \beta_0 + \beta_1 (POSTxMSEMI)_t + \beta_2 (POST)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (YEAR\ FE) + \beta_5 (INDUSTRY\ FE) + \varepsilon_t \quad (5)$$

$$\textbf{Model 2: } RQ = \gamma_0 + \gamma_1 (ALLSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (YEAR\ FE) + \gamma_4 (INDUSTRY\ FE) + \varepsilon_t \quad (6)$$

In models 1 and 2, *RQ* corresponds to reporting quality proxies. *RQ* includes *AQ3* and *AQ5* as proxies for accruals quality, *ABSDACC* (absolute discretionary accruals) and *IIDACC* (income-increasing or positive discretionary accruals) as proxies for accruals manipulation, *PERSIST* as a proxy for earnings persistence and *SMOOTH* as a proxy for earnings smoothness. Detailed explanations of each variable can be found in *Appendix A*. *POST* is an indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than 2015. *MSEMI* is an indicator variable equal to 1 if the reporting period corresponds to mandatory Semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. Similarly, *ALLSEMI* is an indicator variable equal to 1 if the reporting period corresponds to semiannual reporting, including quarterly qualitative reporters, and 0 if the reporting period corresponds to

quarterly quantitative reporting. *CONTROL* is a control vector representing the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. In addition, I employ fixed effects based on the year and industry to control for time-invariant factors that can influence outcomes between individual firms as well as differences in the regulatory environment between industries. When using firms that voluntarily report quarterly as a control group, it is possible to isolate the effect of mandated semiannual reporting by separating the frequently omitted characteristics that shift after the mandatory adoption of less frequent reporting. In the main analyses, I have used robust regressions to address data with outliers and other types of non-normality.

IV. RESULTS

Descriptive Statistics

Table 1, Panel A shows the number of observations based on the reporting behavior of firms before and after the start of less frequent reporting. In Columns 1, 3, 5, and 7, the number of observations is represented based on annual data (quarterly and semiannual data). *Reporting Behavior* is the term used to describe one of four reporting practices: semiannual, quarterly quantitative, quarterly qualitative, or quarterly voluntary reporting. As shown in the annual data, 125 firm-year observations are reported quarterly qualitatively, while 680 firm-year observations are reported quarterly quantitatively in 2008. Based on quarterly and semiannual data, 392 firm-period observations are reported quarterly quantitatively, and 1278 firm-year observations are reported quarterly qualitatively in 2008. Based on the annual data from 2015, 560 firm-year observations are mandatorily reported semiannually, whereas 87 firm-year observations are reported

quantitatively quarterly. A similar analysis of 2015 quarterly and semiannual data shows that 965 firm-period observations mandatorily are reported semiannually, and 266 firm-period observations are voluntarily reported quarterly quantitatively.

< Table 1 Panel A >

Table 1, Panel B, shows the total number of observations reporting quantitatively four times a year, labeled quarterly quantitative reporters (*ALLSEMI* = 0), versus twice a year, labeled semiannual reporters (*ALLSEMI* = 1). Given their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). Based on the annual data for 2008, 125 firm-year observations are reported qualitatively four times a year (quarterly), while 680 firm-year observations are reported quantitatively twice a year (semiannual). Additionally, based on the quarterly and semiannual data for 2008, 392 firm-period observations are reported qualitatively four times a year (quarterly), while 1,278 firm-period observations are reported quantitatively twice a year (semiannual).

< Table 1 Panel B >

Table 2 provides descriptive statistics for the major variables and control variables based on annual data in Panel A, and quarterly and semiannual data in Panel B. The summary statistics are presented according to reporting behavior: semiannual reporting, quarterly reporting, quarterly qualitative reporting, and quarterly voluntary reporting. According to annual data in Panel A, the median *AQ3* is 0.04 for firms reporting semi-annually, 0.05 for firms reporting quarterly quantitatively, 0.04 for firms reporting quarterly qualitatively, and 0.04 for firms voluntarily reporting quarterly quantitatively. Based on quarterly and semiannual data, Panel B shows that the median *AQ3* is 0.10 for firms reporting semi-annually, 0.04 for firms reporting quarterly quantitatively, 0.09 for

firms reporting quarterly qualitatively, and 0.05 for firms voluntarily reporting quarterly quantitatively. Panel B reports similar results based on quarterly and semiannual data.

< Table 2 >

Correlation

Table 2 represents the Pearson correlations using annual data below (quarterly and semiannual data above) and the diagonal for the model variables for the entire sample. The correlation coefficients of yearly data and quarterly and semiannual data are virtually identical in magnitude, direction, and significance.

< Table 3 >

Effect of Reporting Frequency on Accruals Quality

In Table 4, Columns 1-4 show multivariate difference-in-difference analyses of firms' accrual quality on reporting frequency. Accruals quality is measured by *AQ3* and *AQ5*. The variable of interest is the interaction term (*POSTxMSEMI*), which represents the incremental change in accrual quality associated with the mandatory decrease in reporting frequency. If firms' mandatory switch to semiannual reporting incrementally improves accruals quality, the interaction terms associated with *AQ3* and *AQ5* will likely be positive. The coefficients of this interaction term for variables *AQ3* and *AQ5* in Columns 1-4 are positive and statistically significant for all firms. Positive interaction terms suggest that mandatory switching to semiannual (less frequent) reporting enhances accruals quality both based on quarterly and semiannual data and annual data. In *AQ3*, the interaction term exhibits a significantly positive coefficient of 0.038 (0.007) in quarterly and semiannual data (annual data). These results are also economically significant since firms mandatorily switching from quantitative to semi-annual reporting experienced an increase in accruals

quality (*AQ3*) of 3.8 percent (0.7 percent) when using quarterly and semi-annual data (annual data). The interaction term in *AQ5* also exhibits a significant positive coefficient of 0.032 (0.007) in quarterly and semiannual data (annual data).

< Table 4 >

In Columns 1-4 of Table 5, I examine how the shift in reporting frequency affects accruals quality. Upon comparing all semiannual reporters (including quarterly qualitative reporters) with quarterly quantitative reporters, I find similar results to those reported in Table 4. The main variable of interest in Columns 1-4 is the coefficient of *ALLSEMI*, which measures the change in accruals quality associated with a lower frequency of reporting.

< Table 5 >

The coefficients of *ALLSEMI* in Columns 1-4 are positive and statistically significant for both quarterly and semiannual data, indicating that semiannual reporting is associated with improved accruals quality when compared to quarterly reporting. To illustrate, the coefficient of *ALLSEMI* in AQ3 has a significantly positive coefficient of 0.037 (0.003) for quarterly and semiannual data (annual data). Furthermore, semi-annual reporters experienced a 3.7 percent (0.3 percent) increase in accruals quality (*AQ3*) when using quarterly and semi-annual data (annual data). In *AQ5*, the coefficient of *ALLSEMI* is also significantly positive at 0.033 (0.002) in quarterly and semiannual data (annual data).

Overall, Columns 1-4 of Table 4 reveal that, regardless of whether semiannual, quarterly, or annual data are used, less frequent reporting leads to a significant incremental improvement in accruals quality. Compared to quarterly reporting, semiannual reporting has a significantly higher quality of accruals as shown in columns 1-4 of Table 5. These results suggest that more frequent reporting may cause companies to compromise the

quality of reports due to the pressure to show positive results or meet expectations. As companies move towards less frequent reporting, they utilize saved time and resources to improve the quality and transparency of their financial statements. Additionally, I test the robustness of the results by using alternative proxies of accruals quality. I repeat the analyses presented in Columns 1-4 of Tables 4 and 5 using Kothari et al.'s (2005) accruals quality model. Despite the change in the accruals quality proxies, the results (untabulated) do not differ.

Effect of Reporting Frequency on Accruals Manipulation

Table 4, Columns 5-8 show the results of multivariate difference-in-difference analyses of firms' accruals manipulation on reporting frequency. *ABSDACC* and *IIDACC* are used to measure accruals manipulation. I use similar control variables and fixed effects to those used in the previous analyses. The main variable of interest is the interaction term (*POSTxMSEMI*), which examines the incremental change in accruals manipulation associated with the mandatory decrease in reporting frequency. If mandatory semiannual reporting incrementally decreases accruals manipulation, the interaction terms for *ABSDACC* and *IIDACC* will have negative coefficients.

Columns 5-7 show that the coefficients of the interaction term for dependent variables *ABSDACC* and *IIDACC* are negative and significant. The results suggest that mandatory switching to semiannual (less frequent) reporting decreases accruals manipulation both based on quarterly and semiannual data and annual data. As shown in *ABSDACC*, the interaction term has a significantly negative coefficient of –0.025 (0.10) for quarterly and semiannual data (annual data). These results are economically significant since firms

mandatorily switching from quantitative to semiannual reporting experienced a decrease of 2.5 percent (1 percent) in the absolute value of discretionary accruals when using quarterly and semiannual data (annual data). Additionally, the coefficient on the interaction term in *IIDACC* is significantly negative (–0.011) when quarterly and semiannual data are analyzed. On the contrary, the interaction coefficient in *IIDACC* becomes insignificant when annual data are used. It is worth noting that coefficients based on annual data are consistently smaller in magnitude than those based on quarterly and semiannual data. A possible explanation is that it becomes difficult to distinguish differences in frequency when the numbers are accumulated annually.

In Columns 5-8 of Table 5, I examine how semiannual reporting affects accruals manipulation, compared to quarterly quantitative reporting. Upon comparing all semiannual reporters (including quarterly qualitative reporters) with quarterly quantitative reporters, I find similar results to those reported in Table 4. The coefficient of *ALLSEMI* in *ABSDACC* is significantly negative –0.028 (–0.006) for quarterly and semiannual data (annual data). Furthermore, semi-annual reporters experienced a 2.8 percent (0.6 percent) decrease in absolute abnormal accruals when using quarterly and semi-annual data (annual data). The results suggest that semiannual reporting reduces accruals manipulation compared to quarterly reporting. In *IIDACC*, the coefficient of *ALLSEMI* is significantly positive (0.033) when using quarterly and semiannual data. However, when using annual data, *ALLSEMI* becomes insignificant in *IIDACC*.

As shown in Columns 5-6 of Tables 4 and 5, less frequent reporting significantly decreases the absolute value of discretionary accruals, regardless of whether quarterly or semiannual data are used. Column 7 of Tables 4 and 5 yields similar results for income-

increasing discretionary accruals when quarterly and semiannual data are used. However, when using annual data, the coefficients of the main variables of interest in *IIDACC* become insignificant. This suggests that annual data fail to detect differences between less frequent and more frequent reporting. Additionally, the coefficients of the main variables of interest based on annual data are consistently smaller than those based on quarterly and semiannual data. Overall, the results suggest that less frequent reporting reduces accruals manipulation and thus improves reporting quality. These results support the proposition that less frequent financial reports can discourage companies from manipulating their results. The pressure on companies to meet targets is also reduced by reporting less frequently, which may reduce motivations to manipulate reported results.

Effect of Reporting Frequency on Earnings Persistence

Table 6 columns 1 and 2 show the results of multivariate difference-in-difference analyses of earnings persistence based on reporting frequency. The main variable of interest is the interaction term (*POSTxMSEMI*), which represents the incremental change in earnings persistence associated with a mandatory decrease in reporting frequency. The higher (lower) the value of *PERSIST*, the more persistent the earnings. An earnings stream that is more persistent may result in a more sustainable earnings/cash flow stream, and therefore, better quality reporting. This means that *PERSIST* will be positively influenced if the mandatory switch to semiannual reporting incrementally improves earnings persistence.

In Columns 1-2, the coefficients of the interaction term for the variable *PERSIST* are positive and statistically significant for all firms. Thus, it appears that mandatory switching to semiannual (less frequent) reporting increases earnings persistence based on quarterly

and semiannual data as well as annual data. In Columns 1 and 2, the coefficients of the interaction term are 0.303 and 1.54 based on quarterly and semiannual data and annual data, respectively. It must be noted that these results have significant economic implications since firms that have switched from quantitative quarterly to semi-annual reporting have experienced an increase in earnings persistence of 30.3 and 157 percent when using quarterly and semiannual data, and annual data respectively.

< Table 6 >

The results for how semiannual versus quarterly quantitative reporting impacts earnings persistence are presented in Columns 1-2 of Table 7. The results are similar to those reported in Table 6. In Columns 1-2, the principal variable of interest is *ALLSEMI*, which measures the change in earnings persistence associated with semiannual versus quarterly reporting frequency. Statistically significant and positive coefficients of *ALLSEMI* in Columns 1-2 indicate that semiannual reporting increases earnings persistence compared to quarterly reporting. The coefficient of *ALLSEMI* in *PERSIST* is significantly positive at 0.241 (0.588) for quarterly and semiannual data (annual data). Furthermore, semi-annual reporters experienced a 24.1 percent (58.8 percent) increase in earnings persistence when using quarterly and semi-annual data (annual data).

< Table 7 >

Overall, Columns 1-2 of Table 6 reveal that, regardless of whether quarterly and semiannual data or annual data are used, less frequent reporting is associated with incrementally improved earnings persistence. There is a significantly higher persistence of earnings with semiannual reporting compared to quarterly reporting as displayed in columns 1-2 of Table 7. These results indicate that less frequent reporting can result in

more stable and predictable earnings and provide a more accurate picture of a firm's performance over a longer period. The robustness of the results is further tested by using an alternative proxy for earnings persistence. I repeat the analyses presented in Columns 1-2 of Tables 6 and 7 using *EPS* instead of *Earnings*. The results (untabulated) are virtually unchanged from those presented above.

Effect of Reporting Frequency on Earnings Smoothness

Columns 3 and 4 in Table 6 display the findings of multivariate difference-in-difference evaluations of earnings smoothness, contingent on the frequency of reporting. Earnings smoothness measures the stability and sustainability of earnings, as well as the quality of the management and operations of a firm. This attribute can also bolster the perceived quality of earnings, which subsequently builds investor confidence in the firm's disclosed earnings. The coefficient of *SMOOTH* is indicative of the degree of earnings smoothness; a higher value represents a better level of smoothness. Our primary focus is on the interaction variable (*POSTxMSEMI*), which scrutinizes the marginal change in earnings smoothness resulting from a forced decrease in reporting frequency. The coefficient of this interaction term for *SMOOTH* in Column 3 is both positive and statistically significant (0.026; $p < 0.001$), based on quarterly and semiannual data. This outcome suggests that shifting to a semiannual reporting format enhances earnings smoothness. Specifically, firms that transition from quantitative quarterly to semiannual reporting see a 2.6% increase in earnings smoothness - a substantial economic impact. However, the interaction coefficient between *POST* and *MSEMI* in Column 4 loses significance when annual data is considered.

Moving to Table 7, columns 3-4, I further probe the impact of less reporting frequency on earnings smoothness. The findings here align with those in Table 6, Columns 3-4, when contrasting all quarterly qualitative reporters with quarterly quantitative reporters. The key variable of interest here is *ALLSEMI*, which quantifies the change in earnings smoothness linked to a lower reporting frequency. Columns 3-4 reveal statistically significant positive coefficients for *ALLSEMI*, suggesting that semiannual reporting is tied to an increase in earnings smoothness in comparison to quarterly reporting. The *ALLSEMI* coefficient in *SMOOTH* is significantly positive at 0.036 (0.065) for quarterly and semiannual data (annual data). In addition, semiannual reporters saw a 3.6 percent (6.5 percent) rise in earnings smoothness when using quarterly and semi-annual data (annual data).

Based on the data from both quarterly and semiannual periods, it appears that a shift to semiannual reporting correlates with incremental improvements in earnings smoothness and overall quality. When I utilize annual data, the interaction term's coefficient in Table 6's Column 4 becomes insignificant, possibly owing to the inherent limitations of yearly data aggregation. The results also indicate that, compared to quarterly quantitative reporting, semiannual reporting significantly elevates earnings smoothness. On the whole, these findings suggest that less frequent reporting can enhance a firm's earnings stability, sustainability, and the quality of its management and operations. Reporting less often tends to foster smoother earnings, which can boost the perceived quality of earnings by instilling greater investor confidence in a company's reported earnings. To validate these findings, I utilized an alternative measure for earnings smoothness, specifically a five-year rolling window. Further, two additional earnings smoothness proxies were developed: a three-year rolling standard deviation and a ten-year rolling standard deviation. Regardless of the

variations in smoothness proxies, the results (which have not been tabulated) remain consistent with those presented in Tables 6 and 7.

Additional Analyses

I conduct multiple sensitivity analyses to exclude other possible explanations for my results where the goal is to examine whether the outcomes reported above are influenced by different specification options. I apply the same multivariate analyses but with varying limitations to assess the resilience of the conclusions to potential validity risks.

Parallel Assumption Test

It is only possible to estimate the coefficient on the interaction term (*MSEMIxPOST*) if treatment firms and control firms exhibit similar trends before the mandatory frequency change. In this regard, firms that switch to less frequent reporting and those reporting quarterly quantitatively should exhibit similar trends in reporting quality proxies (*AQ3, AQ5*, *ABSDACC*, *IIDACC*, *PERSIST*, and *SMOOTH*) before 2015. I include interactions between *MSEMI* and *Pre7* to *Pre1*, which are indicator variables for the pre-mandatory semiannual reporting periods using year *t-8* as the base year. The coefficients (untabulated) of the interaction terms (*MSEMIxPre7* to *MSEMIxPre1)* are not statistically significant, apart from *MSEMIxPre7*, which is marginally significant at the 10% level for *PERSIST* and *SMOOTH*. Overall, this suggests that there is no systematic difference in reporting quality before the rule change between treatment firms that are required to switch to semiannual reporting after 2014 and control firms that report quarterly quantitatively throughout the entire sample period. As the parallel trend assumption holds, any variation in results between the treatment and control groups after the rule change (after 2014) can

be attributed to the mandatory switching to less frequent reporting, not pre-existing differences.

Alternative Proxies for Measuring Reporting Quality

The meeting of earnings benchmarks is often used as a proxy for reporting quality. Therefore, I use barely meeting benchmarks as an alternative measure of reporting quality. To increase the power of my tests, I utilize a sample of firms suspected of managing thresholds to test how reporting frequency affects managers' propensity to achieve earnings benchmarks. Consistent with prior studies, I label firms as meeting a zero earnings threshold (*MEETZero*) (Roychowdhury 2006; Zang 2012). *MEETZero* is an indicator variable equal to 1 if a firm's earnings before extraordinary items over lagged assets are greater than or equal to 0 but less than 0.005 GBP (Ernstberger et al. 2017). The underlying assumption is that earnings are likely managed to a certain extent when firms meet or beat earnings targets by a small amount. Similarly, I label a firm period as *MEETPrior* - just beating or meeting the prior year's earnings. *MEETPrior* is an indicator variable, which is equal to 1 if the change in basic earnings excluding extraordinary items is greater than or equal to 0 (but less than 0.005 GBP) than the firm's earnings in the same period of the prior year; and 0, otherwise. For analysts' forecast threshold, I treat firm-period earnings as meeting analysts' expectations or avoiding a negative earnings surprise (*NNEGES*). Variable *NNEGES* is an indicator variable equal to 1 if actual earnings are greater than or equal to the last analyst forecast made before the current period's earnings announcement and 0 otherwise. I run the following logit regressions of the odds of achieving earnings benchmarks on reporting frequencies and control variables:

$$\textbf{Model 3: } Prob\,(MEET=1) = F\,(\delta_0 + \delta_1\,(RF)_t + \delta_2\,(CONTROLS) + \delta_3\,(YEAR\ FE) + \delta_4\,(INDUSTRY\ FE) + \varepsilon_t) \quad (7)$$

Here, I test the probability of achieving earnings benchmarks in quarterly reporting versus semiannual reporting. *MEET* represents one of the following three sets of threshold proxies: (1) *NNEGES*; (2) *MEETZero*; (3) *MEETPrior*. *RF* represents one of the following reporting frequency proxies: *MSEMI* and *ALLSEMI*. *CONTROL* is a control vector representing all the control variables in the model. The results (untabulated) show that the coefficients of *MSEMI* and *ALLSEMI* are significant and negative for *MEETZero*, suggesting that firms that mandatorily switch to semiannual reporting are less likely to achieve zero earnings thresholds or avoid losses. However, the coefficients are not statistically significant for *NNEGES* and *MEETprior*.

Alternative Statistical Tests

The main analysis is conducted using robust regressions to account for outliers and other non-normality in the data. To eliminate the possibility of statistical methods influencing the results, I implement alternative statistical techniques and replicate Models 1 and 2 for all variables. For example, as a first alternative statistical method, I use OLS specifications in which I incorporate firm-level clustered standard errors that account for heteroscedasticity and observation clustering. The second alternative method involves using high-dimensional fixed effects models to account for unobserved heterogeneity and improve the accuracy of the estimates in this change in reporting frequency settings. The (untabulated) results are qualitatively like those described in the main results section.

V. CONCLUSION

In this trailblazing study, I have ventured into novel territories, investigating the influence of variations in reporting frequency on the quality of financial reporting. My approach capitalizes on data from the UK capital markets, which due to shifts in mandated

reporting frequency, serves as a unique natural experiment for scrutinizing annual, semiannual, and quarterly reporting patterns. The data reveals that semiannual reporting, in comparison to quarterly reporting, is linked with superior quality of accruals, reduced incidence of accrual manipulation, enhanced earnings persistence, and increased earnings smoothness. Intriguingly, this effect remains robust irrespective of whether the data assessed is quarterly, semiannual, or annual. The crux of these findings strongly suggests that less frequent reporting can lead to improved reporting quality than its more frequent counterpart. This understanding carries weighty policy implications for regulators who are navigating the delicate balance of optimal reporting frequency to promote transparency and elevate the quality of reporting.

It is crucial, however, to acknowledge the limitations of this study. The most significant constraint is its sole focus on firms from the United Kingdom. While the UK situation provides a unique opportunity for a natural experiment, these results may not hold universally. For instance, the United States has mandated timely reviews of quarterly financial statements since 2000, a policy shown to increase the relevance and reliability of reported earnings. Consequently, extended reporting periods may not have the same impact on earnings quality in the US or other countries with enforced interim reviews. To address this limitation, future research could undertake cross-cultural comparisons or seek other instances where natural experiments exist. An experimental trial of semi-annual reporting among a select group of US registrants by the SEC could be another practical avenue to explore.

Furthermore, the proxies I used in this study to measure reporting quality, despite being well-accepted in literature, may not capture all facets of reporting quality and might

be susceptible to measurement errors. For instance, earnings smoothness could potentially reflect manipulation of earnings to achieve smoother results rather than necessarily indicating higher reporting quality. To tackle this, I incorporated multiple measures of reporting quality and refined existing ones, striving for a more accurate and robust representation of reporting quality and reporting frequency. Finally, while the study distinguishes between firms that disclose quantitative information and those that reveal qualitative information, with the primary focus on firm-period reporting IMS quantitatively, it has not explored in depth the impact of qualitative reporting on reporting quality. Future research could delve into the effects of qualitative reporting and its relationship with reporting frequency, furnishing further insights into the complex interplay between reporting frequency and reporting quality.

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APPENDIX A

Variables	Descriptions
AQ3	*AQ3* is a proxy for accrual quality calculated as the three-year rolling standard deviation of the estimated residuals based on modified Dechow and Dichev (2002)'s accrual quality models. The variable *AQ3* is multiplied by -1 to make its association with accrual quality positive;
AQ5	*AQ5* is also a proxy for accrual quality calculated as the five-year rolling standard deviation of the estimated residuals based on modified Dechow and Dichev (2002)'s accrual quality models. The variable *AQ5* is multiplied by -1 to make its association with accrual quality positive;
ABSDACC	An absolute value discretionary accrual, which refers to the portion of a firm's earnings that cannot be explained by underlying economic performance and instead are attributable to management discretion;
IIDACC	*IIDACC* is the income–increasing portion of discretionary accrual (*DACC*) or positive value of *DACC*. *IIDACC* is equal to *DACC* when *DACC*>0 and 0, otherwise;
PERSIST	*PERSIST* is the beta coefficient of the following model: $Earnings_{t+1} = \alpha + \beta(Earnings_t) + \varepsilon_t$;
SMOOTH	*SMOOTH*, which is calculated as follows: $SMOOTH = \sigma(Earnings)/\ \sigma(CFO)$. The standard deviation is calculated over a rolling five-year window. The variable *SMOOTH* is multiplied by –1 to make the association between variable *SMOOTH* and earnings smoothness positive;
POST	An indicator variable equal to 1 if fiscal year is greater than 2014; and 0 if fiscal year is greater than 2007 and less than or equal to 2014;
MSEMI	*MSEMI* is an indicator variable equal to 1 if the reporting period corresponds to mandatory Semiannual reporting (twice a year); and 0 if the reporting period corresponds to quarterly quantitative reporting (four times a year);
ALLSEMI	An indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1).
SIZE	Natural log of beginning-of-period total assets of the firm to control for size differences;
GROWTH	The change in sales scaled by beginning-of-period total assets to control for growth;
ROA	Return on asset (Net income scaled by beginning-of-period total assets);
ADR	An indicator variable equal to 1 if U.K. firms cross-listed in U.S.; and 0, otherwise;
LEV	*LEV* represents leverage calculated as total liabilities ÷ total assets;

TABLE 1

Panel A: Sample Distribution by Year and Reporting Behavior

	Reporting Behavior	***Quarterly Quantitative Reporting***		***Quarterly Qualitative Reporting***		***Semiannual Reporting***		***Quarterly Voluntary Reporting***	
		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
		Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data
Before									
	2008	125	392	680	1278	.	.	.	.
	2009	124	411	654	1223	.	.	.	.
	2010	125	336	613	1097	.	.	.	.
	2011	115	305	597	1001	.	.	.	.
	2012	169	564	458	791	.	.	.	.
	2013	111	383	542	889	.	.	.	.
	2014	60	219	587	977	.	.	.	.
After									
	2015	.	.	.	.	560	965	87	266
	2016	.	.	.	.	549	944	91	265
	2017	.	.	.	.	557	891	109	389
	2018	.	.	.	.	515	941	111	430
	2019	.	.	.	.	534	984	62	248

TABLE 1 – *Continued*

Panel B: Sample Distribution by Year and Quantitative Reporting: Semiannually vs. Quarterly

		All Quarterly Quantitative Reporting vs. All Semiannual Reporting			
		ALLSEMI = 0		*ALLSEMI* = 1	
		(1)	*(2)*	*(3)*	*(4)*
		Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data
Before					
	2008	125	392	680	1278
	2009	124	411	654	1223
	2010	125	336	613	1097
	2011	115	305	597	1001
	2012	169	564	458	791
	2013	111	383	542	889
	2014	60	219	587	977
After					
	2015	87	266	560	965
	2016	91	265	549	944
	2017	109	389	557	891
	2018	111	430	515	941
	2019	62	248	534	984

Panel A of Table 1 depicts the annual number of observations based on firms' reporting behavior before and after the start of less frequent reporting. Columns 1, 3, 5 and 7 (columns 2,4,6 and 8) represent the number of observations for each year based on annual data (quarterly and semiannual data). *Reporting Behavior* refers to one of four reporting practices: semiannual reporting, quarterly quantitative reporting, quarterly qualitative reporting, or quarterly voluntary reporting. Variables are defined in Appendix A.

Panel B shows the total number of firm-year observations reporting quantitatively four times a year, labeled quarterly quantitative reporters (*ALLSEMI* = 0), versus twice a year, labeled semiannual reporters (*ALLSEMI* = 1). Quarterly qualitative reporters are considered to be semiannual reporters (*ALLSEMI* = 1) on the basis of their reporting behavior.

TABLE 2

Panel A: Descriptive Statistics on Reporting Frequency Using Annual Data

Reporting Behavior		***AQ3***	***AQ5***	***ABSDACC***	***IIDACC***	***PERSIST***	***SMOOTH***	***SIZE***	***GROWTH***	***ROA***	***ADR***	***LEV***
Semiannual Reporting	*N*	2419	2420	2715	2715	2715	2566	2715	2317	2715	2715	2715
	Mean	0.06	0.07	0.07	0.04	25.86	–3.13	4.37	31.76	–0.08	0.02	0.52
	SD	0.06	0.06	0.09	0.07	211.15	30.86	2.16	317.95	0.28	0.14	1.35
	Q1	0.02	0.03	0.02	0.00	4.91	–1.91	2.70	–2.64	–0.15	0.00	0.23
	Median	0.04	0.05	0.05	0.01	7.46	–1.10	4.12	7.12	0.01	0.00	0.41
	Q3	0.07	0.08	0.09	0.05	16.65	–0.65	5.79	20.23	0.08	0.00	0.61
Quarterly Quantitative Reporting	*N*	632	632	825	829	829	776	829	730	829	829	829
	Mean	0.07	0.07	0.07	0.04	51.81	–2.75	4.95	141.23	–0.05	0.07	0.49
	SD	0.07	0.07	0.09	0.08	446.71	14.04	2.24	2975.28	0.22	0.25	0.29
	Q1	0.02	0.03	0.02	0.00	4.52	–2.20	3.36	–14.42	–0.10	0.00	0.26
	Median	0.05	0.05	0.05	0.00	7.70	–1.12	4.67	0.78	0.01	0.00	0.49
	Q3	0.08	0.08	0.09	0.04	21.96	–0.68	6.68	14.51	0.07	0.00	0.68
Quarterly Qualitative Reporting	*N*	3031	3033	4129	4131	4131	3844	4131	3582	4131	4131	4131
	Mean	0.07	0.07	0.07	0.04	42.52	–2.75	4.10	182.02	–0.05	0.02	0.46
	SD	0.07	0.07	0.08	0.07	455.27	19.91	2.06	5239.73	0.24	0.13	0.42
	Q1	0.02	0.03	0.02	0.00	5.83	–1.81	2.53	–5.38	–0.09	0.00	0.25
	Median	0.04	0.05	0.05	0.00	7.62	–0.99	3.87	5.95	0.02	0.00	0.43
	Q3	0.08	0.08	0.10	0.05	13.00	–0.55	5.36	20.74	0.08	0.00	0.61
Quarterly Voluntary	*N*	428	428	460	460	460	441	460	405	460	460	460
	Mean	0.06	0.06	0.07	0.03	51.03	–1.69	5.12	7.39	–0.07	0.07	0.52

Reporting	*SD*	0.06	0.05	0.09	0.07	256.03	1.98	2.27	77.91	0.23	0.25	0.36
	Q1	0.02	0.03	0.02	0.00	2.38	–1.94	3.33	–8.33	–0.12	0.00	0.30
	Median	0.04	0.04	0.05	0.00	6.97	–1.09	4.83	3.70	–0.01	0.00	0.47
	Q3	0.06	0.07	0.09	0.04	21.15	–0.66	6.82	15.79	0.06	0.00	0.69

TABLE 2 – *Continued*

Panel B: Descriptive Statistics on Reporting Frequency Using Quarterly and Semiannual Data

Reporting Behavior		***AQ3***	***AQ5***	***ABSDACC***	***IIDACC***	***PERSIST***	***SMOOTH***	***SIZE***	***GROWTH***	***ROA***	***ADR***	**LEV**
Semiannual Reporting	N	4612	4446	4562	4725	4725	4538	4725	3286	4725	4725	4725
	Mean	0.13	0.13	0.01	0.01	18.79	–0.78	4.36	33.06	–0.06	0.02	0.52
	SD	0.10	0.10	0.02	0.01	113.77	3.80	2.29	457.82	1.13	0.14	1.73
	Q1	0.06	0.05	0.00	0.00	5.70	–0.59	2.61	–6.08	–0.07	0.00	0.21
	Median	0.10	0.09	0.01	0.00	6.27	–0.31	4.05	4.48	0.00	0.00	0.40
	Q3	0.18	0.15	0.02	0.01	8.79	–0.18	5.77	16.92	0.04	0.00	0.61
Quarterly Quantitative Reporting	N	2562	2536	2575	2610	2610	2561	2610	2308	2610	2610	2610
	Mean	0.06	0.06	0.04	0.02	49.53	–0.67	5.28	174.06	–0.02	0.04	0.49
	SD	0.05	0.05	0.07	0.06	225.75	1.33	2.54	4617.86	0.18	0.20	0.30
	Q1	0.02	0.02	0.00	0.00	5.65	–0.66	3.38	–6.97	–0.02	0.00	0.26
	Median	0.04	0.04	0.01	0.00	6.43	–0.31	4.97	0.00	0.00	0.00	0.47
	Q3	0.07	0.07	0.04	0.01	12.95	–0.18	7.03	9.67	0.02	0.00	0.66
Quarterly Qualitative Reporting	N	7011	6888	7150	7256	7256	6952	7256	5282	7256	7256	7256
	Mean	0.12	0.12	0.01	0.01	16.18	–0.63	4.05	38.58	–0.04	0.01	0.46
	SD	0.10	0.10	0.01	0.01	122.63	2.69	2.14	621.46	0.23	0.11	0.41
	Q1	0.06	0.05	0.00	0.00	5.89	–0.53	2.43	–7.71	–0.05	0.00	0.24

	Median	0.09	0.09	0.01	0.00	6.30	–0.26	3.80	2.76	0.01	0.00	0.43
	Q3	0.16	0.15	0.02	0.01	7.60	–0.16	5.33	14.84	0.04	0.00	0.60
Quarterly Voluntary Reporting	N	1553	1526	1579	1598	1598	1568	1598	1421	1598	1598	1598
	Mean	0.06	0.06	0.04	0.02	38.27	–0.60	5.23	164.21	–0.02	0.06	0.53
	SD	0.04	0.05	0.08	0.06	208.91	1.60	2.51	3836.84	0.11	0.23	0.39
	Q1	0.03	0.03	0.00	0.00	5.49	–0.56	3.28	–3.64	–0.02	0.00	0.30
	Median	0.05	0.04	0.01	0.00	6.34	–0.32	4.88	0.00	0.00	0.00	0.48
	Q3	0.08	0.07	0.05	0.01	10.78	–0.20	7.02	8.80	0.02	0.00	0.71

Table 1 Panels A (Panel B) presents descriptive statistics for the major variables and control variables using annual data (quarterly and semiannual data). The sample period is 2008-2019. *Reporting Behavior* refers to one of four reporting practices: semiannual reporting, quarterly quantitative reporting, quarterly qualitative reporting, or quarterly voluntary reporting. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%.

TABLE 3

Correlation among the Main Variables

	(1)	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***	***(7)***	***(8)***	***(9)***	***(10)***	***(11)***
(1) AQ3		0.90*	–0.53*	–0.30*	0.05*	0.00	0.26*	–0.02	0.28*	–0.01	–0.01
(2) AQ5	0.94*		–0.50*	–0.28*	0.05*	0.02	0.28*	–0.02*	0.30*	–0.01	–0.01
(3) ABSDACC	0.02*	0.04*		0.61*	–0.04*	–0.00	–0.24*	0.03*	–0.25*	0.00	0.01
(4) IIDACC	0.02*	0.03*	0.73*		–0.02*	–0.02	–0.15*	0.03*	–0.06*	–0.01	–0.03*
(5) PERSIST	–0.08*	–0.08*	–0.01	0.00		0.01	0.19*	0.00	0.09*	0.23*	0.00
(6) SMOOTH	0.03*	0.03*	0.03*	0.01	–0.03*		–0.01	0.00	–0.03*	–0.01	–0.01
(7) SIZE	–0.41*	–0.39*	–0.08*	–0.04*	0.29*	0.07*		–0.01	0.39*	0.20*	0.03*
(8) GROWTH	0.02*	0.02*	0.06*	0.00	0.00	–0.00	–0.02		0.00	0.00	–0.01
(9) ROA	–0.09*	–0.09*	–0.02*	0.00	0.03*	0.07*	0.10*	0.00		–0.01	–0.13*
(10) ADR	–0.04*	–0.03*	0.02*	0.03*	0.07*	0.02	0.16*	0.00	0.00		0.02
(11) LEV	–0.02*	–0.02*	0.00	–0.02*	0.01	–0.07*	0.03*	–0.01	–0.55*	0.02*	

Pearson correlations are reported for the period 2008-2019. Correlation coefficients using annual data (quarterly and semiannual data) appear above (below) the diagonal. Correlations are restricted to full firm-period sample. All the variables are Winsorized at 1% and 99%. Correlations significant at the 10% level or lower are marked with star. Variables are defined in Appendix A.

TABLE 4

DiD Regressions of Firms' Accrual Quality and Accrual Manipulation on Reporting Frequency

Model 1: $DV = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (Industry\ FE) + \varepsilon_t$

	DV = AQ3		***DV = AQ5***		***DV = ABSDACC***		***DV = IIDACC***	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
MSEMIxPOST	0.038 ***	0.007 *	0.032 ***	0.007 **	–0.025 ***	–0.010 *	–0.011 ***	–0.004
	(6.12)	(1.68)	(9.51)	(2.24)	(–9.83)	(–1.78)	(–6.15)	(–0.77)
POST	0.004 **	–0.029 **	–0.002	–0.023 ***	0.005 *	–0.006	0.000	–0.001
	(2.08)	(–3.11) *	(–1.30)	(–2.75)	(1.72)	(–0.75)	(0.03)	(–0.13)
SIZE	–0.006 ***	–0.006 **	–0.004 ***	–0.006 ***	–0.003 ***	–0.007 ***	–0.002 ***	–0.004 ***
	(–9.50)	(–5.77) *	(–8.75)	(–6.32)	(–8.68)	(–6.46)	(–6.46)	(–4.56)
GROWTH	0.000 ***	0.000 **	0.000 ***	0.000 ***	0.000	0.000 ***	–0.000 ***	–0.000
	(6.09)	(7.03) *	(3.54)	(5.46)	(1.20)	(3.97)	(–2.86)	(–1.05)
ROA	–0.034 ***	–0.077 **	–0.009 ***	–0.082 ***	–0.001	–0.087 ***	–0.000	–0.021
	(–12.12)	(–4.54) *	(–7.97)	(–5.36)	(–0.79)	(–4.12)	(–1.63)	(–1.31)
ADR	0.012 ***	0.013	0.009 ***	0.014 *	0.003	0.008	0.002	0.003
	(5.47)	(1.59)	(4.50)	(1.86)	(0.79)	(1.31)	(0.95)	(0.51)
LEV	0.002 **	0.013	0.006 ***	0.008	–0.000	0.013	–0.001 **	–0.014 **
	(2.48)	(1.27)	(13.89)	(0.99)	(–1.11)	(1.15)	(–2.39)	(–2.52)
R^2	0.57	0.25	0.42	0.30	0.57	0.16	0.03	0.06
#Obs.	5,893	1,861	5,893	1,861	5,864	1,998	5,864	1,998
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included	Included	Included

Table 4 shows the results of multivariate difference-in-difference analyses of firms' accrual quality and accrual manipulation on reporting frequency. Accruals quality is measured by *AQ3* and *AQ5*, while accrual manipulation is measured by *ABSDACC* and *IIDACC.* In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if fiscal year is greater than 2014; and 0 if fiscal year is greater than 2007 and less than 2015. *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. Sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 5

Regression Analyses of Firms' Accrual Quality and Accrual Manipulation on Reporting Frequency

Model 2: $DV = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (YEAR\ FE) + \gamma_4 (INDUSTRY\ FE) + \varepsilon_t$

	DV = AQ3		***DV = AQ5***		***DV = ABSDACC***		***DV = IIDACC***	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
AllSEMI	0.037 ***	0.003 **	0.033 **	0.002 *	–0.028 ***	–0.006 **	–0.013 ***	–0.002
	(8.51)	(2.30)	(8.54) *	(1.72)	(–7.07)	(–1.99)	(–12.38)	(–0.98)
SIZE	–0.007 ***	0.003 **	–0.006 **	0.004 ***	–0.003 ***	–0.007 ***	–0.001 ***	–0.005 ***
	(–9.15)	(5.04) *	(–11.14) *	(6.82)	(–9.86)	(–9.20)	(–7.07)	(–9.14)
GROWTH	0.000 ***	–0.000 **	0.000 **	–0.000 ***	0.000	0.000 ***	–0.000 ***	0.000 ***
	(4.27)	(–2.14)	(7.28) *	(–3.39)	(1.17)	(4.59)	(–2.75)	(4.17)
ROA	–0.075 ***	0.019 **	–0.077 **	0.024 ***	–0.000	–0.057 ***	–0.000	0.012
	(–7.35)	(8.53) *	(–12.02) *	(10.73)	(–0.84)	(–5.36)	(–0.59)	(1.44)
ADR	0.013 ***	–0.008 **	0.014 **	–0.011 ***	0.004	0.015 **	0.004	0.008
	(5.02)	(–3.01) *	(5.24) *	(–4.22)	(1.11)	(2.54)	(1.45)	(1.47)
LEV	0.008 ***	–0.001	0.008 **	–0.001 *	–0.001	–0.000	–0.001 *	–0.002 **
	(11.33)	(–1.33)	(11.29) *	(–1.95)	(–0.69)	(–0.09)	(–1.90)	(–2.01)
R^2	0.47	0.12	0.42	0.15	0.11	0.11	0.04	0.04
#Obs.	12,208	6,003	12,208	6,003	12,218	7,034	12,218	7,034
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included	Included	Included

Table 5 shows the results of how the shift in reporting frequency affects accrual quality and accrual manipulation. Accruals quality is measured by *AQ3* and *AQ5*, while accrual manipulation is measured by *ABSDACC* and *IIDACC*. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with t-statistics in parentheses that are calculated robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. Sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 6

DiD Regressions of Firms' Earnings Persistence and Smoothness on Frequency of Reporting

Model 1: $DV = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (YEAR\ FE) + \beta_5 (INDUSTRY\ FE) + \varepsilon_t$

	DV = PERSIST		***DV = SMOOTH***	
	(1)	(2)	(3)	(4)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
MSEMIxPOST	0.303 ***	1.54 **	0.026 ***	0.004
	(3.44)	(2.24)	(3.47)	(0.77)
POST	–0.198	–0.089	–0.050 ***	–0.189 **
	(–1.39)	(–0.09)	(–3.98)	(–2.20)
SIZE	0.711 ***	2.258 ***	0.017 ***	–0.043 ***
	(5.48)	(8.81)	(13.34)	(–4.22)
GROWTH	0.000	0.000	0.000 *	0.000
	(0.16)	(1.62)	(1.69)	(0.20)
ROA	1.859 ***	17.672 ***	0.351 ***	0.932 ***
	(6.88)	(3.61)	(8.49)	(8.55)

ADR	–1.208	***	–1.202	–0.001		0.128
	(–6.18)		(–1.22)	(–0.11)		(1.55)
LEV	0.136	***	–0.413	–0.023	***	0.009
	(5.25)		(–0.55)	(–4.81)		(0.14)
R^2	0.55		0.41	0.19		0.08
#Obs.	5,893		1,996	5,893		1,996
Year FE	Included		Included	Included		Included
Industry FE	Included		Included	Included		Included

Table 6 shows the results of multivariate difference-in-difference analyses of earnings persistence and earnings smoothness based on reporting frequency. Earnings persistence is measured by *PERSIST*, which is the beta coefficient of the following model: $Earnings_{t+1} = \alpha + \beta(Earnings_t) + \varepsilon_t$. Smoothness in earnings is measured by *SMOOTH*, which is calculated as follows: $SMOOTH = \sigma(Earnings)/\sigma(CFO)$. The standard deviation is calculated over a rolling five-year window. The variable *SMOOTH* is multiplied by –1 in order to make the association between variable *SMOOTH* and earnings smoothness positive. In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if fiscal year is greater than 2014; and 0 if fiscal year is greater than 2007 and less than 2015. *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. Sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 7

Regression Analyses of Firms' Earnings Persistence and Smoothness on Reporting Frequency

Model 2: $DV = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (YEAR\ FE) + \gamma_4 (INDUSTRY\ FE) + \varepsilon_t$

	DV = PERSIST		***DV = SMOOTH***	
	(1)	(2)	(3)	(4)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
AllSEMI	0.241 ***	0.588 ***	0.036 ***	0.065 ***
	(8.27)	(3.62)	(8.82)	(2.63)
SIZE	0.388 ***	1.371 ***	0.018 ***	–0.017 ***
	(16.22)	(11.30)	(9.87)	(–3.36)
GROWTH	–0.000	0.000 ***	0.000 *	–0.000
	(–0.02)	(2.69)	(1.68)	(–0.14)
ROA	3.251 ***	9.350 ***	0.186 ***	0.704 ***
	(13.02)	(13.45)	(15.88)	(15.64)
ADR	4.432 ***	6.497 ***	–0.024 *	–0.045
	(16.17)	(14.11)	(–1.95)	(–0.78)
LEV	0.408 ***	0.581 ***	–0.018 ***	0.003
	(8.28)	(8.27)	(–5.22)	(0.30)
R^2	0.84	0.84	0.12	0.07
#Obs.	12,297	7,016	12,297	7,016
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included

Table 7 shows the results of how the shift in reporting frequency affects earnings persistence and earnings smoothness. Earnings persistence is measured by *PERSIST*, which is the beta coefficient of the model: $Earnings_{t+1} = \alpha + \beta(Earnings_t) + \varepsilon_t$. Smoothness in earnings is measured by *SMOOTH*, which is calculated as

follows: *SMOOTH* = *σ(Earnings)/ σ(CFO).* The standard deviation is calculated over a rolling five-year window. The variable *SMOOTH* is multiplied by –1 in order to make the association between variable *SMOOTH* and earnings smoothness positive. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. Sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

ESSAY 2: THE IMPACT OF REPORTING FREQUENCY ON THE COST OF DEBT, EQUITY, AND OPERATIONS

I. INTRODUCTION

The significance of financial reporting is gaining considerable momentum in the constantly evolving business sphere. It has become an increasingly vital instrument for ensuring transparency, adhering to regulatory protocols, and articulating financial performance to crucial stakeholders, such as investors and creditors. The essence of financial reporting extends beyond mere compliance as it serves as the crucial link between businesses and investors, providing the latter with the relevant, accurate information required for informed decision-making. The frequency at which financial reports are made available profoundly influences the accessibility and quality of information investors utilize for decision-making (e.g., Balakrishnan and Ertan 2018; Downar et al. 2018; Fu et al. 2012; Greenstone et al. 2006). It plays a pivotal role in shaping a firm's transparency and credibility and bears substantial cost implications. The importance of research concerning the optimal frequency of financial reporting cannot be stressed enough, as it bears significant implications for many stakeholders, including investors, regulators, and managers (Kajüter, Lessenich, Nienhaus, and van Gemmern 2022).

This paper aims to investigate the costs associated with changing reporting frequency, emphasizing the impact on borrowing, equity, and operating costs of a business. A better understanding of the cost consequences of reporting frequency can help stakeholders evaluate the trade-offs between increased reporting frequency and its associated costs. Comprehending the link between reporting frequency and costs may allow firms to

optimize resource allocation, improving operational efficiency and profitability. Firms can strike an ideal balance between reporting costs and benefits, enabling more efficient resource use, which may result in cost savings that can be distributed to shareholders or reinvested in growth and innovation. This research offers evidence-based insights for regulators when devising optimal frequency of financial reporting. Policymakers need to consider the effects of reporting frequency on cost components and balance them against broader market advantages. A well-informed, data-driven understanding of the cost implications of reporting frequency can promote the development of more effective and balanced regulations, fostering a robust financial market ecosystem.

More frequent reporting can provide investors with up-to-date information, thereby enabling them to make timely investment decisions (Bushman 1991; Lundholm 1991; Fu et al. 2012). Reporting frequency may also affect market efficiency as regards the rate at which new information is integrated into stock prices (Balakrishnan and Ertan 2018; Downar et al. 2018; Fu et al. 2012a; Greenstone et al. 2006). Increased reporting frequency can lead to accelerated price adjustments and increased market efficiency (Tsao, Lu, and Keung 2018). Conversely, this may also increase market volatility if the quality of information is subpar or if investors exhibit overreaction to the new information (Mensah and Werner 2008). More frequent reporting could also induce short-termism in managers, favoring immediate results over sustained growth (*see* Gigler et al. 2014; Ernstberger et al. 2017; Kraft et al. 2018; Nallareddy et al. 2019; Hillegeist et al. 2020). It is incumbent upon regulators and policymakers to determine the ideal frequency of financial reporting to harmonize the interests of diverse stakeholders. Research in this domain can provide valuable insights to guide their decisions and formulate effective regulations that promote

transparency, market efficiency, and investor protection without imposing undue compliance burdens on firms.

On the other hand, less frequent reporting may result in cost savings from lower operational expenses but could negatively affect the company's cost of capital due to increased information asymmetry and perceived risk by investors and creditors. The purpose of this paper is to explore how reporting frequency empirically affects the cost of debt, cost of equity, and cost of operating. By examining these aspects, this paper offers valuable insights for corporate managers, investors, and policymakers to better comprehend the intricate relationship between reporting frequency and its associated costs, ultimately assisting investors in making well-informed decisions on this crucial facet of financial reporting.

In 2007, the government of the U.K. made it mandatory for firms to submit quarterly interim management statements (IMS) to improve transparency and accountability in the financial sector. In 2014, however, the Financial Conduct Authority (FCA) removed this requirement, citing concerns about the costs and burden of compliance on firms (Pozen, Nallareddy, and Rajgopal 2017)[1]. This change in reporting frequency in the U.K. has created a natural experiment that allows us to study the relationship between reporting frequency and the quality of financial reporting in a controlled and unbiased way.

[1] The EU Transparency Directive (TD), which was established by the European Commission to establish uniform capital market regulations across the EU, mandated that companies must submit Interim Management Statements (IMSs) on a quarterly basis starting in 2007. These IMSs must include information about any significant events or transactions that occurred during the period and their impact on the company's financial status, as well as a summary of the company's financial performance and position. However, the FCA proposed to eliminate the requirement for quarterly IMSs for firms that fall under the FCA's Disclosure and Transparency Rules (DTR) in November 2014. This proposal was approved by both the UK and EU, and the elimination of mandatory quarterly reporting became law in the UK in November 2015. It's worth noting that the FCA does not dictate the specific content that should be included in IMSs (Pozen et al. 2017).

I use annual, quarterly, and semiannual data from U.K. firms in this study. By employing difference-in-difference and pre/post analysis on a sample of firms affected by mandatory changes in reporting frequency, I seek to provide empirical evidence on the consequences of altering financial reporting frequency. The results demonstrate that a mandatory shift from quarterly to semiannual reporting frequency is associated with increased borrowing, equity, and operating costs. The increase in the cost of debt suggests that creditors perceive firms reporting on a semiannual basis as riskier than those reporting quarterly, leading to higher interest expense for those firms. Firms that shift to semiannual reporting have also experienced increased costs of equity, as demonstrated by declining earnings-to-price and returns-on-equity ratios. Additionally, the analysis reveals that less frequent reporting leads to increased operating costs, implying potential inefficiencies or lack of timely managerial response to changing business conditions. The potential explanations for this observation include a possible loss of financial discipline within firms due to less frequent reporting, leading to less scrutiny by investors and regulators and, subsequently, higher operating costs. Additionally, less frequent reporting may limit the information available to investors, resulting in increased uncertainty and perceived risk.

This investigation adds new insights that contribute substantially to our understanding of the cost dynamics of reporting frequency change. Firstly, this study, to my understanding, marks the first exploration into the impact of reporting frequency on the cost of debt and operational expenses in the realm of accounting research. This research highlights the potential negative consequences of less frequent financial reporting on firms' financing and operating costs. Considering how the frequency of reporting affects firms'

performance and risk profiles, these findings demonstrate the costs and consequences of reducing reporting frequency.

Secondly, by elucidating the trade-offs linked with different reporting frequencies, I offer firms, investors, and regulators evidence-based guidance to aid decision-making concerning optimal reporting frequency. I emphasize the potential for firms to optimize their resources by balancing the costs and benefits of various reporting frequencies, which could enhance operational efficiency and profitability. The findings indicate that a reduction in reporting frequency may result in elevated financing costs for firms, attributable to the escalation of borrowing and equity costs. This phenomenon could subsequently affect firms' capacity to procure debt and equity capital, influence investment decisions, and impede overall growth prospects. Therefore, it is imperative that firms meticulously evaluate the potential advantages of decreasing reporting frequency as opposed to the possible increase in borrowing, equity, and operating costs. Furthermore, investors may find it useful to consider reporting frequency when evaluating investment opportunities, as less frequent reporting could signal higher operating costs and potential inefficiencies.

Thirdly, my results underline the regulatory implications of reporting frequency. By revealing the tangible costs tied to changes in reporting frequency, I furnish regulators with substantial evidence to inform policy decisions. The understanding that less frequent reporting can augment the cost of debt, equity, and operating costs could provoke regulators to reevaluate policies promoting less frequent reporting. This contribution is crucial, especially as regulators grapple with balancing transparency and market efficiency against the compliance burden on firms.

Lastly, this research is the first to comprehensively examine reporting frequency utilizing quarterly, semiannual, and annual data, as obtaining quarterly and semiannual data can be empirically challenging. Prior studies have primarily used annual data, potentially masking reporting quality differences more evident in finer-grained data (Ernstberger et al. 2017; Kraft et al. 2018; Nallareddy et al. 2019; Hillegeist et al. 2020. As such, the validity and reliability of these studies could be thoughtfully questioned. Analyzing quarterly and semiannual data offers more extensive insights into the cost implications of changing reporting frequency, as demonstrated by the detectable differences in these data sets.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Cost of Debt and Reporting Frequency

An enhanced comprehension of the interplay between financial reporting frequency and borrowing costs is instrumental in promoting capital market efficiency and honing decision-making processes. This understanding equips market participants with the necessary tools for risk pricing and resource allocation, facilitating a more adept distribution of capital throughout an economy. Moreover, it provides regulators with valuable insights for formulating policies that fine-tune financial reporting practices and their periodicity. Remarkably, despite its significance, the association between debt costs and reporting frequency remains relatively unexplored.

The impact of reporting frequency on borrowing costs is multifaceted. Higher reporting frequency can instigate a shift towards short-termism among managers, leading them to focus on immediate financial returns over long-term strategic aims (Bhojraj and Libby 2005; Fu, Kraft, and Zhang 2012b). This predisposition could amplify stock price

volatility, creating a perception of increased risk for lenders and thereby driving up borrowing costs. Furthermore, the additional time and effort necessitated by more frequent reporting can detract management from critical business operations, possibly impairing the firm's efficiency and financial performance. This can cause an uptick in debt costs. In situations where a firm has a track record of mediocre financial performance or is perceived as risky due to frequent reporting, lenders may become reluctant to offer financing or demand higher interest rates, escalating the firm's borrowing costs. More frequent reporting also raises the probability of errors or omissions in financial statements, potentially inviting regulatory scrutiny or penalties. This increased risk can deter lenders, resulting in higher borrowing costs. While more frequent reporting can enhance transparency, it can also lead to information overload for investors and analysts (Cuijpers and Peek 2010), causing a scenario where only a certain subset of market participants can thoroughly understand and analyze the extra data. This may result in information asymmetry (Kim and Verrecchia 1991; McNichols and Trueman 1994) and potentially higher borrowing costs.

Conversely, while less frequent financial reporting might reduce administrative demands and associated costs, it could simultaneously raise perceived risks among debt investors, negatively affecting debt costs. The lack of regular, timely financial information might deter lenders, leading to increased interest rates, higher transaction costs, or reduced credit limits (Brealey and Myers 2017). Infrequent reporting could obstruct a lender's understanding of a company's financial health, potentially jeopardizing their creditworthiness assessment. Credit rating agencies may view these companies as riskier due to restricted visibility into financial health, leading to higher interest rates. Moreover, less frequent reporting might provoke heightened volatility in stock and debt prices as

investors might overreact to delayed information, further raising the cost of debt. The decreased transparency might intensify information asymmetry (Fu et al. 2012), leading to investors demanding a higher risk premium. The perception of diminished transparency might also cast doubts on management integrity and financial reporting quality, stirring concerns about the company's ability to meet debt obligations. This could lead investors to demand higher yields for perceived risk compensation (Brealey and Myers 2017). Furthermore, less frequent reporting may lead to less efficient debt securities pricing, causing investors to demand higher yields to counterbalance potential pricing inefficiencies. Considering the contrary conjectures from the above discussion, I formulate the following hypotheses in the null form:

H1: Reporting frequency is not associated with the cost of debt.

Cost of Equity and Reporting Frequency

Drawing on a rich body of literature, we grapple with a fundamental and complex question: Does an increase in the frequency of corporate financial disclosures lead to a decrease in the cost of equity? There is a wide range of research on this topic with diverse, often conflicting, findings. One compelling perspective argues that a more frequent reporting rhythm decreases the cost of equity by curbing adverse selection and estimation risks (Diamond and Verrecchia 1991; Handa and Linn 1993). This viewpoint has received robust empirical support from studies, such as Fu et al. (2012), which find that a higher reporting frequency indeed leads to lower equity costs. This observation stands strong even when we factor in the endogenous nature of firms' disclosure frequency decisions. Shroff et al. (2017) support this sentiment, positing that richer information about a firm weakens the negative correlation between peer firms' information environment and the firm's cost

of equity. Botosan and Plumlee (2002) further nuance this argument, suggesting that while the cost of equity climbs with the level of quarterly report disclosure, it tapers off with the level of annual report disclosure.

However, a counter-narrative exists. Some researchers argue that the relationship between disclosure frequency and the cost of equity is context-specific. Zhang (2001), Hughes et al. (2007) and Lambert et al. (2007) convincingly assert that this relationship hinges on what prompts variation in disclosure levels and whether the disclosures convey non-diversifiable risk information. The impact of reporting frequency on the cost of equity, therefore, is not straightforward. Frequent financial reporting can provide investors with regular updates, aiding their decision-making processes. Yet, the influx of information can ignite market volatility due to noise or information overload. If the information disclosed is selective or irrelevant to value, it could foster information asymmetry (Van Buskirk 2012; Kraft et al. 2018). The subsequent volatility may lead investors to perceive higher risk, demanding higher returns, thereby inflating the cost of equity (Kim and Verrecchia 1994). Moreover, frequent reporting could also trigger short-termism, pressuring managers to prioritize immediate results over strategic long-term goals. This could shake investor confidence, demanding higher returns to offset perceived threats to the firm's future success, thus raising the cost of equity (Ernstberger et al. 2017).

On the other hand, less frequent reporting can starve investors of timely information, snowballing uncertainty (Easley et al. 2003). This lack of transparency can heighten the perceived risk, increasing the cost of equity (Lambert et al. 2007). Additionally, a paucity of regular updates may reduce market efficiency and liquidity (Bushman, Piotroski, and Smith 2004), amplifying volatility and bid-ask spreads, which could in turn result in a

higher cost of equity (Healy and Palepu 2001). The contrasting implications of these arguments render it difficult to predict the directionality of the relationship between reporting frequency and the cost of equity. I thus present the following null hypotheses:

H2: Reporting frequency is not associated with the cost of equity.

Operating Costs and Reporting Frequency

Our understanding of how reporting frequency impacts operating costs remains nebulous, comparable to its effects on equity and debt costs. A significant research gap exists concerning the association between financial reporting frequency and operating costs. This gap necessitates a comprehensive examination to determine the optimal reporting frequency, a balance between the provision of timely information and cost-effectiveness, benefiting both internal and external stakeholders. This research direction will not only augment academic understanding and support advancements in technology but will also empower investors and stakeholders with enriched information to make well-informed decisions.

While timely financial reporting is pivotal, the advantages of less frequent reporting warrant attention. Less frequent reporting enables management to adopt a long-term perspective, fostering strategic planning and decision-making that could enhance operational efficiency (Gigler et al. 2014). This approach could free up resources within accounting departments, allowing for a more streamlined focus on value-generating activities (Graham et al. 2005). Not only could this mitigate the pressure of incessant reporting deadlines and reduce employee burnout, but it could also foster a sustainable work environment and boost employee satisfaction. With fewer reporting duties, more attention can be devoted to ensuring the reliability of financial reports, thereby boosting stakeholder confidence. Furthermore, less frequent reporting can diminish audit and

compliance costs, streamline software solutions, and curtail the need for constant system upgrades, ultimately driving down the firm's overall operating costs.

On the contrary, frequent reporting, while appearing burdensome due to increased labor costs and time commitments, may offer long-term benefits that surpass these initial costs. Frequent reporting delivers timely information, empowering management to make informed decisions regarding resource allocation, cost control, and operational efficiency (Kanodia and Lee 1998; Kanodia 2006; Hillegeist, Kausar, Kraft, and Park 2020). This practice can allow businesses to swiftly identify and rectify issues impacting operating costs, and in turn, prevents larger, more costly problems in the future. Frequent reporting also promotes employee accountability, market agility, and internal collaboration (Doyle, Ge, and Mcvay 2007), thereby enhancing efficiency and reducing miscommunication-related costs. Firms that report frequently are likely to foster a culture of continuous improvement, leading to reduced operating costs and improved financial performance over the long run. Therefore, the association between reporting frequency and operating costs remains an open question, warranting further exploration. Thus, I propose the following null hypotheses, considering the contrarian conjectures discussed above:

H3: Reporting frequency is not associated with operating costs.

III. DATA AND METHODOLOGY

Sample Selection

The initial sample is collected from Compustat Global for all firm periods from 2007 to 2020. The empirical analyses are, however, performed on observations originating in the year 2008 because one year of lagged data is required to generate the complete set of

variables used in the analyses. For quarterly and semiannual data, I verify the accuracy of the data and manually code the reporting frequency of each firm by examining the firm's posted financial statements and Thomson Reuters Eikon database. Observations with assets below 1 million GBP are eliminated from my analysis to avoid outliers since I use total assets as a scaler (Bryan and Mason 2020; Pacheco-Paredes and Wheatley 2021). Consistent with prior studies, I eliminate firm-period observations with SIC codes 4400-5000 and 6000-6999 that represent regulated industries, banks, and financial institutions with different reporting practices (Matsumoto 2002; Cheng and Warfield 2005).

Specification of Reporting Frequency

Sample period 2008-2014

Firms that disclose sales and/or earnings information (after 2007 but before 2014) at a quarterly frequency are labeled as "mandatory quarterly quantitative reporting firms." These firms are expected to have quarterly IMSs in the Thomson Reuters Eikon database and different quarterly sales and/or earnings numbers in the Compustat Global database (e.g., *period1* number differs from *period2*, and *period3* differs from *period4*).

Firms that disclose quarterly qualitative information with or without sales and/or earnings numbers are classified as "mandatory quarterly qualitative reporting firms". These firms are expected to have quarterly IMSs in the Thomson Reuters Eikon database but identical *period1* and *period2* and (or) identical *period3* and *period4* sales or earnings numbers in the Compustat Global database.[2]

[2] This is because for semi-annual or qualitative reporters, the database simply assigns half of the semi-annual number to each of the quarters making up the semi-annual period.

Sample period 2015-2019

Firms that disclose sales and/or earnings information after 2014 at a quarterly frequency are labeled as "voluntary quarterly reporters." These firms are expected to have quarterly IMSs in the Thomson Reuters Eikon database and different quarterly sales or earnings numbers in the Compustat Global database (e.g., *period1* number differs from *period2*, and *period3* differs from *period4*).

Firms that reported semiannually, either quantitative or qualitative information, after 2014 are labeled as "mandatory semiannual reporters." These firms are expected to have semiannual IMSs in the Thomson Reuters Eikon database and identical *period1* and *period2* and (or) identical *period3* and *period4* sales or earnings numbers in the Compustat Global database.[3]

Variable Definitions

Main Variables

Interest expense is intrinsically linked to the cost of debt, as it constitutes the financial charges a firm incurs for procuring funds through borrowing. I thus use interest expense as a direct measure of the cost of debt. The two proxies I use to measure the cost of debt are *COD/DEBT* and *COD/ASSET*. *COD/DEBT* is calculated as interest expense deflated by after-tax debt.[4] *COD/ASSET* represents interest expense scaled by the average total assets of a firm. As a firm borrows money, the cost of debt is the effective interest rate it pays on

[3] After 2007 quarterly interim management statement (IMS) implementation, some firms (quarterly qualitative reporters) only released quarterly qualitative information without sales or earnings figures. Their reporting behavior is more akin to semiannual reporting, although they appear to report quarterly. Prior U.K. data-based research has misclassified these reporters as quarterly instead of semiannual (*see* Rahman and Schleicher 2015; Ernstberger et al. 2017; Nallareddy et al. 2019; Hillegeist et al. 2020). To rectify this issue, I first compare quantitative quarterly reporters with mandatory semiannual reporters, excluding qualitative quarterly reporters. Subsequently, I compare quantitative quarterly reporters with all semiannual reporters, categorizing quarterly qualitative reporters as semiannual reporters.

[4] I also use interest expense scaled by total debt as an alternative measure, which does not affect the results reported.

the borrowed funds, while interest expenses refer to the financial burden that comes with obtaining the funds. A positive relationship exists between interest expense and the cost of debt since an increase in borrowing corresponds to an increase in interest expense. Accordingly, higher (lower) *COD/DEBT* or *COD/ASSET* indicates the more (less) cost of borrowing for a firm. Factors such as borrowing costs, interest rates, credit risk, and debt structure may influence the overall cost of debt and interest expense experienced by a firm.

I measure the cost of equity using the earnings-to-price ratio (*E2P*) and return on equity (*ROE*) ratios. The *E2P* ratio is calculated as earnings per share divided by the average closing price for each period. Following Francis et al. 2005,[5] I replace *E2P* as missing when the ratio is negative. The *ROE* is estimated as income before interest and taxes divided by shareholders' equity. Both *E2P* and *ROE* are negatively associated with the cost of equity due to their implications for perceived risk. A higher *E2P* ratio suggests a stock may be undervalued, decreasing its associated risk and consequently lowering the cost of equity. Similarly, a higher *ROE* indicates efficient utilization of equity to generate profits, reducing perceived risk and leading to a lower required return for investors. Thus, both *E2P* and *ROE* ratios exhibit an inverse relationship with the cost of equity, as higher values for these financial metrics generally signify reduced risk, resulting in a diminished expected return on investment for shareholders.

As a direct measure of operating costs, I use operating expenses. Specifically, *OPCOST/SALE* and *OPCOST/ASSET* are the two proxies I use to measure operating costs. *OPCOST/SALE* represents a firm's operating expenses scaled by total sales. Similarly, *OPCOST/ASSET* represents operating expenses scaled by average total assets. While the

[5] It appears that the *E2P* ratio results reported in the main section are unaffected even after the removal of this data restriction.

terms "operating expenses" and "operating costs" are often used interchangeably, context determines their meaning. Operating expenses, a subset of operating costs, exclude the cost of goods sold (*COGS*) and cover expenditures such as employee remuneration, rent, and utilities. Operating costs, on the other hand, include all expenses associated with operations, including *COGS*. As much as I expect reporting frequency to affect operating costs, it is highly unlikely to affect *COGS*. Costs associated with operating expenses are positively associated with operating costs.

Control Variables

In line with previous research, I have controlled for firm-specific characteristics that could influence the cost consequences of reporting frequency. Due to the increased likelihood of large firms affecting the cost consequences differently, I control for size differences using the variable *Size*, where *Size* is the natural log of the beginning-of-period total assets of the firm. Because growth firms have different cost structures than non-growth firms and may pursue various strategies depending on their frequency of reporting, I control for growth using *GROWTH*, where *GROWTH* is the change in sales scaled by beginning-of-period total assets. Dechow et al. (1998) suggest that measurement errors are positively related to performance when abnormal values are calculated using conventional estimation models. Therefore, I employ *ROA* (net income scaled by beginning-of-period total assets) to control for measurement errors since a higher net income makes it easier for businesses to avoid losses and achieve other earnings targets.

U.K. companies cross-listed in the U.S. have incentives to report quarterly even when only semiannual reporting is mandated. So, I control for cross-listing using an indicator variable, *ADR*, where *ADR* is equal to 1 if the U.K. company is cross-list in the U.S., and 0 otherwise. Additionally, the ability of a firm to meet its financial obligations may impact

the cost consequences of reporting frequency, so I include the variable *LEV* (total liabilities divided by total assets) to control for a firm's financial flexibility. In addition, a set of indicator variables for industries is included to account for fixed effects specific to a given industry, as this may affect this association. Industry dummy variables (i.e., *INDUSTRY FE*) are derived from the first two digits of the Standard Industrial Classification (SIC) code. Also included are fixed effects for each year in the sample period (i.e., *YEAR FE*) to control for variations in economic conditions.

Model Estimates

I measure *H1-H3* using a difference-in-differences (diff-in-diff) approach and a base pre/post model to examine the cost implications of reporting frequency. The treatment group (*MSEMI* = 1) in the diff-in-diff approach consists of firms that are required to begin reporting semiannually following the rule change (post-period) from quarterly quantitative reporting in 2015. Firms in the control group (*MSEMI* = 0) report quarterly quantitatively throughout the entire sample period. *H1-H3* are tested by estimating two models using robust regressions:

$$\textbf{Model 1: } DV = \beta_0 + \beta_1 (POSTxMSEMI)_t + \beta_2 (POST)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (INDUSTRY\ FE) + \varepsilon_t \quad (1)$$

$$\textbf{Model 2: } DV = \gamma_0 + \gamma_1 (ALLSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (YEAR\ FE) + \gamma_4 (INDUSTRY\ FE) + \varepsilon_t \quad (2)$$

In Model 1 and Model 2, the dependent variable (DV) represents proxies for the cost of debt, cost of equity, and operating costs. The dependent variable encompasses *COD/DEBT* and *COD/ASSET* as proxies for the cost of debt; *E2P* and *ROE* as proxies for

the cost of equity; and *OPCOST/SALE* and *OPCOST/ASSET* as proxies for operating costs. Comprehensive descriptions of each variable are provided in *Appendix A*. *POST* is an indicator variable assigned a value of 1 if the fiscal year exceeds 2014 and 0 if the fiscal year ranges between 2007 and 2014. The treatment indicator variable *MSEMI* is assigned a value of 1 if the reporting period corresponds to compulsory semiannual reporting and 0 if the reporting period corresponds to quarterly quantitative reporting. Likewise, *ALLSEMI* is an indicator variable assigned a value of 1 if the reporting period corresponds to semiannual reporting, which includes quarterly qualitative reporters, and 0 if the reporting period corresponds to quarterly quantitative reporting.

The *'CONTROL'* vector represents a set of control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Furthermore, I employ fixed effects based on year and industry to account for time-invariant factors that may influence outcomes between individual firms and variations in the regulatory environment across industries. By using firms that voluntarily report quarterly as a control group, it is possible to isolate the impact of mandated semiannual reporting by separating the frequently omitted characteristics that change following the compulsory adoption of less frequent reporting. In the primary analyses, robust regression techniques have been employed to address data containing outliers and other instances of non-normality.

IV. RESULTS

Descriptive Statistics

Table 1 presents the number of observations related to firms' reporting Behavior before and after the shift to less frequent reporting. Columns 1, 3, 5, and 7 display the

observations based on annual data, while Columns 2,4,6, and 8 show observations based on quarterly and semiannual data. I categorize *Reporting Behavior* into four distinct reporting practices: semiannual, quarterly quantitative, quarterly qualitative, and quarterly voluntary reporting. The annual data reveals that in 2008, there were 134 firm-year observations for quarterly quantitative reporting and 718 firm-year observations for quarterly qualitative reporting. When examining the quarterly and semiannual data for 2008, I find 467 firm-period observations for quarterly quantitative reporting and 1467 firm-year observations for quarterly qualitative reporting. Looking at the 2015 annual data, I observe that 559 firm-year observations are mandatorily reported semiannually, while 86 firm-year observations follow voluntary quarterly quantitative reporting. Similarly, the analysis of 2015 quarterly and semiannual data indicates that 1088 firm-period observations are mandatorily reported semiannually, and 308 firm-period observations voluntarily adhered to quantitative quarterly reporting.

< Table 1 >

Table 2 represents descriptive statistics for the primary variables and control variables, with Panel A focusing on quarterly and semiannual data and Panel B examining annual data. The summary statistics are presented according to different reporting behaviors, including semiannual reporting, quarterly reporting, quarterly qualitative reporting, and quarterly voluntary reporting. In Panel A, which is based on quarterly and semiannual data, we find that the median *COD/DEBT* is 0.04 for firms reporting semiannually, 0.02 for firms reporting quarterly quantitatively, 0.03 for firms reporting quarterly qualitatively, and 0.02 for firms voluntarily reporting quarterly quantitatively. Panel B, which analyzes annual data, reveals similar results. For instance, the median

COD/DEBT is 0.08 for firms reporting semiannually, 0.10 for firms reporting quarterly quantitatively, 0.11 for firms reporting quarterly qualitatively, and 0.07 for firms voluntarily reporting quarterly quantitatively.

< Table 2 >

Univariate Analysis

Table 3 Panel A (Panel B) presents the results of the Comparative Univariate Analysis of Treatment and Control Groups based on quarterly and semiannual data (annual data). Quarterly and semiannual data in Panel A show that the treatment group, representing firms with mandatory semiannual reporting behavior, has significantly higher values for the following variables: *COD/DEBT* (cost of debt relative to total debt), *COD/ASSET* (cost of debt relative to total assets), *OPCOST/SALE* (operating costs relative to sales), *OPCOST/ASSET* (operating costs relative to total assets), *GROWTH* (growth rate of the firm), *ROA* (return on assets), and *ADR* (cross-listing). This suggests that, compared to the control group, firms in the treatment group have higher debt and operating costs, higher growth, higher profitability, and higher cross-listing in the U.S. Simultaneously, the treatment group shows significantly lower values for *E2P* ratio (earnings-to-price ratio), *SIZE* (firm size), and *LEV* (leverage ratio), indicating that these firms are smaller, have lower earnings relative to their stock prices (higher equity costs), and lower debt levels.

< Table 3 >

On the other hand, Panel B, which is based on annual data, reveals that the treatment group has significantly lower values for *COD/DEBT*, *COD/ASSET*, and *E2P*, suggesting that these firms have lower costs of debt and lower earnings relative to their stock prices. However, the treatment group displays significantly higher values for *GROWTH*, *ROA*,

and *ADR*, indicating that these firms have higher growth rates, higher profitability, and a more significant presence in foreign markets. The contrasting findings between Panel A and Panel B may arise due to the different data frequencies used in the analysis. These differences in results highlight the importance of considering both types of data when analyzing the relationship between reporting Behavior and financial performance.

Correlation

Table 4 displays the Pearson correlation coefficients for all variables using annual data below the diagonal and quarterly and semiannual data above the diagonal, encompassing the entire sample. Upon examination, the correlation coefficients derived from annual, quarterly, and semiannual data demonstrate similar characteristics in magnitude, direction, and statistical significance.

< Table 4 >

Effect of Reporting Frequency on Cost of Debt

Table 5 represents multivariate difference-in-differences analyses and pre/post analyses of firms' cost of debt in relation to reporting frequency. The cost of debt is measured by *COD/DEBT* and *COD/ASSET*. In the diff-in-diff analyses found in Columns 1, 2, 5, and 6, the main variable of interest is the interaction term (*POSTxMSEMI*), representing the incremental change in the cost of debt linked to the mandatory decrease in reporting frequency. Suppose the mandatory shift to semiannual reporting leads to an increase (decrease) in the cost of debt (i.e., interest expense). In that case, the interaction terms linked to *COD/DEBT* and *COD/ASSET* are likely to be positive (negative). For

variables *COD/DEBT* and *COD/ASSET* in Columns 1, 2, and 5, the coefficients of this interaction term are positive and statistically significant across all firms. This suggests that the mandatory transition to semiannual (less frequent) reporting raises the cost of debt based on quarterly and semiannual data and annual data (excluding Column 6). In *COD/DEBT*, for example, the interaction term demonstrates a significantly positive coefficient of 0.015 (0.010) in quarterly and semiannual data (annual data). These findings bear economic significance, as firms that mandatorily switched from quarterly to semiannual reporting experienced a 1.5% (1.0%) increase in after-tax deflated interest expense when using quarterly and semiannual data (annual data).

< Table 5 >

In Columns 3, 4, 7, and 8 of Table 5, I explore the overall effects of the change in reporting frequency on the cost of debt through a pre/post design. The key variable of interest here is the coefficients of *ALLSEMI*, which measures the change in the cost of debt associated with a lower reporting frequency. When comparing all semiannual reporters (including quarterly qualitative reporters) with quarterly quantitative reporters, I find results similar to the diff-in-diff analyses in Table 5. For instance, the coefficients of *ALLSEMI* in Columns 3, 7, and 8 are positive and statistically significant for semiannual data, quarterly, and annual data, indicating that semiannual reporting is correlated with an increased cost of debt compared to quarterly quantitative reporting. The coefficient of *ALLSEMI* in *COD/ASSET* has a significantly positive coefficient of 0.001 (0.001) for quarterly and semiannual data (annual data). The findings suggest that semiannual reporters experienced a 1.0% (1.0%) increase in interest expense (scaled by asset) when using quarterly and semiannual data (annual data).

The results indicate that the mandatory switch from quarterly to semiannual reporting frequency has a significant impact on firms' cost of debt. Specifically, the analysis reveals that the cost of debt increases for firms that are required to report their financial information less frequently, i.e., semiannually instead of quarterly. Less frequent reporting is associated with higher interest expenses. This finding implies that creditors may perceive companies reporting on a semiannual basis as riskier compared to those reporting quarterly. Consequently, these firms may face higher borrowing costs in the form of increased interest expenses. Except in Columns 4 and 6, the consistency of these results across different data types—semiannual, quarterly, and annual—reinforces the conclusion that less frequent reporting leads to higher costs of debt. In summary, this research highlights the potential negative consequences of less frequent financial reporting on firms' borrowing costs.

Effect of Reporting Frequency on Cost of Equity

Table 6 presents the results of my examination of the association of reporting frequency with the cost of equity through multivariate diff-in-diff and pre/post analyses. The cost of equity is represented by the *E2P* and *ROE* ratios, both of which display an inverse association with the cost of equity. Higher values for these financial indicators generally signify reduced risk, leading to a lower expected return on investment for shareholders. If a mandatory switch to semiannual reporting increases (decreases) the cost of equity, the interaction terms related to *E2P* and *ROE* are expected to be negative (positive). In the diff-in-diff analyses, except for Column 2, the coefficients of the interaction term for *E2P* and *ROE* in Columns 1, 5, and 6 are negative and statistically significant. These negative interaction terms imply that the mandatory transition to

semiannual reporting raises the equity cost based on quarterly and semiannual data and annual data. For example, when employing quarterly and semiannual data, the interaction term exhibits a significantly negative coefficient of –0.004 (–0.009) for *E2P* (*ROE*). These results bear economic significance, as firms mandated to switch from quantitative to semiannual reporting experience a decline in the *E2P* (*ROE*) ratio of 0.4% (0.9%) when using quarterly and semiannual data. However, when analyzing annual data, only the coefficient associated with *ROE* is negative and significant.

< Table 6 >

In Columns 3, 4, 7, and 8 of Table 6, I present the results of my investigation of the overall effects of the shift in reporting frequency on the cost of equity using a pre/post design. The primary variable of interest is *ALLSEMI*, which measures the change in the cost of equity associated with a lower reporting frequency. Comparing all semiannual reporters (including quarterly qualitative reporters) with quarterly quantitative reporters, I observe results akin to those reported in the diff-in-diff analyses in Table 6. The coefficients of *ALLSEMI* in Columns 3, 4, and 7 are negative and statistically significant for semiannual, quarterly, and annual data, suggesting that semiannual reporting corresponds to a decrease in the earnings-to-price ratio and return on equity compared to quarterly reporting. For instance, the coefficient of *ALLSEMI* in *E2P* has a significant coefficient of –0.002 (–0.003) for quarterly and semiannual data (annual data). Semiannual reporters experience a 0.2% (0.3%) decrease in the earnings-to-price ratio when using quarterly and semiannual data (annual data).

In summary, the results reported in Table 6 demonstrate that less frequent reporting, regardless of whether semiannual, quarterly, or annual data are utilized, leads to a

significant incremental decrease in *E2P* and *ROE*. The findings indicate that a mandatory switch to less frequent reporting is associated with an increase in the cost of equity. This increase in the cost of equity is observed consistently across different datasets, including quarterly, semiannual, and annual data.

Effect of Reporting Frequency on Operating Costs

Table 7 presents a comprehensive examination of the impact of reporting frequency on firms' operating costs through multivariate difference-in-differences (diff-in-diff) and pre/post analyses. Operating costs are represented by two ratios: *OPCOST/SALE* and *OPCOST/ASSET*. Given the positive relationship between operating expenses and operating costs, we can expect that if a mandatory switch to semiannual reporting causes an increase (decrease) in operating costs, the interaction terms associated with *OPCOST/SALE* and *OPCOST/ASSET* will be positive (negative). With the exception of the results presented in Column 2 of the diff-in-diff analysis, the coefficients for the interaction term of variables *OPCOST/SALE* and *OPCOST/ASSET* in Columns 1, 5, and 6 are positive and statistically significant across all firms. This implies that mandatory conversion to less frequent (semiannual) reporting leads to an increase in operating costs, as observed in both quarterly and semiannual data, as well as annual data (excluding Column 2). For example, the interaction term in *OPCOST/ASSET* exhibits a significantly positive coefficient of 0.152 (0.070) in quarterly and semiannual data (annual data). These results demonstrate economic significance, as firms transitioning from quarterly to semiannual reporting experience a 15.2% (7.0%) increase in operating expenses scaled by average total assets when utilizing quarterly and semiannual data (annual data).

< Table 7 >

In Columns 3, 4, 7, and 8 of Table 7, I present the results of my investigation of the overall effects of the shift in reporting frequency on operating costs using a pre/post design. The primary variable of interest is the coefficients of *ALLSEMI*, which measures the change in operating costs associated with a lower reporting frequency. With the exception of the results presented in Column 4, the coefficients of *ALLSEMI* in Columns 3, 7, and 8 are positive and statistically significant for semiannual data, as well as quarterly and annual data. This indicates that, in comparison to quarterly reporting, semiannual reporting is correlated with increased operating costs. For instance, the coefficient of *ALLSEMI* in *OPCOST/ASSET* is significantly positive at 0.171 (0.027) for quarterly and semiannual data (annual data). In addition, semiannual reporters experienced a 17.1% (2.7%) increase in operating expenses (scaled by average total assets) when using quarterly and semiannual data (annual data).

In conclusion, the results presented in Table 7 consistently demonstrate that, regardless of the data frequency (semiannual, quarterly, or annual), less frequent reporting is associated with a significant incremental increase in operating expenses. The results reveal a significant positive association between less frequent reporting (semiannual instead of quarterly) and increased operating costs. This implies that when companies are mandated to switch from quarterly to semiannual reporting, their operating expenses, as a proportion of total sales or average total assets, tend to increase. This trend is evident across various data types, including quarterly, semiannual, and annual datasets.

Additional Analyses

To exclude other possible explanations for my results, I perform multiple sensitivity analyses. This enables me to investigate if the outcomes reported above are influenced by certain specification options. For assessing validity risks, I repeat the same multivariate analyses with varying limitations.

< Table 8 >

Parallel Assumption Test

It is only possible to estimate the coefficient on the interaction term (*MSEMIxPOST*) if treatment firms and control firms exhibit similar trends before the mandatory frequency change. To test the parallel trends assumption, I employ an approach that examines the presence of pre-existing treatment effects by including lead and lag variables of the treatment indicator. Specifically, I generate a lead variable (*LEAD_MSEMI*) representing the treatment status one period ahead and a lag variable (*LAG_MSEMI*) representing the treatment status one period behind. I then estimate a linear regression model where the outcome variable is regressed on the time variable (*POST*), lead and lag variables of the treatment variable, and an interaction term between the treatment and time variables (*MSEMI_POST*). The coefficients on the lead and lag variables capture potential treatment effects in the periods before the actual treatment. If these coefficients are jointly statistically significant, it would suggest that the parallel trends assumption is violated, as it would indicate the presence of pre-existing treatment effects. Table 8 (Panels A-C) shows the results of the parallel trends assumption. The results show that the coefficients on *LEAD_MSEMI* and *LAG_MSEMI* are not jointly statistically significant in Panels A-C, supporting the validity of the parallel trends assumption in the diff-in-diff framework. This finding indicates that, in the absence of the treatment, the treatment and control groups

would have followed parallel trends, allowing us to credibly estimate the causal effect of the treatment on the outcome variable.

Alternative Statistical Tests

In the main analyses, I use robust regression techniques to deal with outliers and non-normality within the data. In order to preclude the potential impact of statistical techniques (i.e., robust regression) on the main findings, alternative statistical approaches are implemented, re-examining Models 1 and 2 and reproducing results for all variables. For instance, as an initial alternative statistical technique, Ordinary Least Squares (OLS) specifications are utilized, incorporating firm-level clustered standard errors that account for heteroscedasticity and observation clustering. As a second alternative approach, high-dimensional fixed effects models are employed to address unobserved heterogeneity, thereby enhancing the precision of estimations within the context of reporting frequency changes. The (unreported) results are qualitatively similar to those reported in the main results.

V. CONCLUSIONS

This research sheds light on the cost implications of reporting frequency. The findings show that a mandatory shift from quarterly to semiannual reporting frequency leads to increased borrowing, equity, and operating costs for companies. The increase in debt costs implies that creditors view companies reporting semiannually as riskier than those reporting quarterly, resulting in higher interest expenses for the firms. Similarly, the rise in equity costs suggests that shareholders expect a greater return on investment from firms that report less frequently, potentially due to an increased risk perception related to less frequent financial disclosures. These results highlight the need to weigh the possible

negative outcomes of reducing reporting frequency on a company's financing costs. The findings also reveal that less frequent reporting is connected to higher operational costs, as companies experience increased operating expenses relative to total sales or average total assets. This implies that less frequent reporting may have unintended consequences on firms' operational efficiency.

These results suggest that reducing financial reporting frequency from quarterly to semiannual could have negative effects on companies, resulting in higher debt, equity, and operating costs. These findings support the idea that more frequent reporting may enhance transparency and information quality for stakeholders, reducing information asymmetry and risk perception. This could lead to lower borrowing costs and better operational efficiency. By taking these findings into account, companies can make more informed choices about their reporting practices and optimize resource allocation to achieve enhanced operational efficiency and profitability. In light of these results, regulators should carefully examine the potential negative impacts of less frequent reporting on company-level costs before changing reporting requirements. Future studies could investigate additional factors influencing the relationship between reporting frequency and company-level costs and examine the potential advantages and drawbacks of alternative reporting frequency.

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APPENDIX A

Variables	Descriptions
COD/DEBT	*COD/DEBT* is calculated as interest expense deflated by after-tax debt;
COD/ASSET	*COD/ASSET* represents interest expense scaled by the average total assets of a firm;
E2P	Earnings-to-price ratio (*E2P*) is calculated as earnings per share divided by the average closing price for each period;
ROE	Return on equity *(ROE)* is estimated as income before interest and taxes divided by shareholders' equity;
OPCOST/SALE	*OPCOST/SALE* represents a firm's operating expenses scaled by total sales;
OPCOST/ASSET	*OPCOST/ASSET* represents operating expenses scaled by average total assets;
POST	An indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than or equal to 2014;
MSEMI	*MSEMI* is an indicator variable equal to 1 if the reporting period corresponds to mandatory Semiannual reporting (twice a year) and 0 if the reporting period corresponds to quarterly quantitative reporting (four times a year);
ALLSEMI	An indicator variable, in which 1 represents firms reporting quantitatively twice a year, is labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1).
SIZE	Natural log of beginning-of-period total assets of the firm to control for size differences;
GROWTH	The change in sales scaled by beginning-of-period total assets to control for growth;
ROA	Return on asset (Net income scaled by beginning-of-period total assets);
ADR	An indicator variable equal to 1 if U.K. firms cross-listed in the U.S.; and 0 otherwise;
LEV	*LEV* represents leverage calculated as total liabilities ÷ total assets;
Quarterly Quantitative	Mandatory Quarterly Quantitative Reporting, an indicator variable equal to 1 if the reporting period is greater than 2007 and less than 2015 and the firm discloses sales and earnings information at the quarterly frequency; and 0, otherwise;
Quarterly Qualitative	Mandatory Quarterly Qualitative Reporting, an indicator variable equal to 1 if the reporting period is greater than 2007 and less than 2015 but the firm does not disclose sales and earnings information at the quarterly frequency; and 0, otherwise;
Quarterly Voluntary	Voluntary Quarterly Quantitative Reporting, an indicator variable equal to 1 if the reporting period is greater than 2014 and the firm voluntarily discloses sales and earnings information at the quarterly frequency; and 0, otherwise;
Semiannual	Mandatory Semiannual Reporting, an indicator variable equal to 1 if the reporting period is greater than 2014 and the firm mandatorily discloses sales and earnings information twice a year; and 0, otherwise;

TABLE 1
Sample Distribution by Year and Reporting Behavior

	Reporting Behavior	***Quarterly Quantitative Reporting***		***Quarterly Qualitative Reporting***		***Semiannual Reporting***		***Quarterly Voluntary Reporting***	
		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
		Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data
Before									
	2008	134	467	718	1467	.	.	.	.
	2009	129	450	705	1318	.	.	.	.
	2010	127	383	642	1139	.	.	.	.
	2011	116	339	619	1097	.	.	.	.
	2012	184	620	488	899	.	.	.	.
	2013	115	415	560	985	.	.	.	.
	2014	62	237	605	1126	.	.	.	.
After									
	2015	.	.	.	.	559	1088	86	304
	2016	.	.	.	.	541	1013	86	291
	2017	.	.	.	.	537	991	99	413
	2018	.	.	.	.	519	983	114	449
	2019	.	.	.	.	532	993	59	249

Table 1 describes the annual number of observations based on firms' reporting Behavior before and after the start of less frequent reporting. Columns 1, 3, 5, and 7 (columns 2,4,6 and 8) represent the number of observations for each year based on annual data (quarterly and semiannual data). *Reporting Behavior* refers to one of four reporting practices: semiannual reporting, quarterly quantitative reporting, quarterly qualitative reporting, or quarterly voluntary reporting. Variables are defined in Appendix A.

TABLE 2

Panel A: Descriptive Statistics on Reporting Frequency Using Quarterly and Semiannual Data

Reporting Behavior		***COD /DEBT***	***COD /ASSET***	***E2P***	***ROE***	***OPCOST /SALE***	***OPCOST /ASSET***	***SIZE***	***GROWTH***	***ROA***	***ADR***	***LEV***
Semiannual Reporting	N	2947	3876	2672	5068	4520	5059	5068	3477	5068	5068	5068
	Mean	0.216	0.005	0.028	–0.037	5.128	0.416	4.498	32.684	–0.039	0.020	0.409
	SD	0.996	0.007	0.082	0.206	17.625	0.392	2.255	443.81	0.201	0.138	0.237
	Q1	0.023	0.001	0.008	–0.047	1.600	0.167	2.763	–5.164	–0.060	0.000	0.214
	Median	0.038	0.003	0.014	0.008	1.810	0.309	4.261	4.706	0.009	0.000	0.397
	Q3	0.078	0.007	0.023	0.037	2.117	0.521	5.995	16.664	0.038	0.000	0.583
Quarterly Quantitative Reporting	N	1913	2393	1110	1994	2640	2890	2911	2499	2911	2911	2911
	Mean	0.235	0.004	0.030	–0.011	2.061	0.193	5.242	166.37	–0.016	0.041	0.464
	SD	1.479	0.004	0.054	0.137	6.983	0.177	2.453	4448.2	0.147	0.197	0.262
	Q1	0.016	0.001	0.010	–0.024	0.779	0.070	3.419	–5.481	–0.018	0.000	0.261
	Median	0.025	0.002	0.017	0.013	0.894	0.152	4.975	0.000	0.005	0.000	0.468
	Q3	0.053	0.005	0.029	0.042	0.989	0.266	6.981	9.678	0.019	0.000	0.640
Quarterly Qualitative Reporting	N	4589	6165	2981	5246	7317	8025	8031	5635	8031	8031	8031
	Mean	0.417	0.006	0.029	–0.020	4.811	0.460	4.104	31.457	–0.034	0.011	0.434
	SD	2.092	0.008	0.060	0.150	15.717	0.402	2.115	522.12	0.205	0.104	0.262
	Q1	0.031	0.001	0.010	–0.033	1.641	0.182	2.515	–7.328	–0.045	0.000	0.241
	Median	0.052	0.004	0.017	0.012	1.837	0.357	3.886	2.871	0.011	0.000	0.430
	Q3	0.119	0.008	0.027	0.038	2.037	0.611	5.393	14.835	0.037	0.000	0.595
Quarterly Voluntary Reporting	N	1143	1422	859	1706	1574	1706	1706	1501	1706	1706	1706
	Mean	0.116	0.003	0.022	–0.021	2.099	0.190	5.362	154.06	–0.008	0.057	0.478
	SD	0.516	0.004	0.040	0.156	7.730	0.179	2.374	3732	0.054	0.232	0.238
	Q1	0.012	0.001	0.007	–0.036	0.780	0.072	3.450	–3.241	–0.020	0.000	0.297
	Median	0.018	0.002	0.013	0.008	0.887	0.139	5.040	0.004	0.003	0.000	0.483

	Q3	0.036	0.004	0.022	0.035	0.994	0.252	7.052	9.409	0.016	0.000	0.675

TABLE 2 – *Continued*

Panel B: Descriptive Statistics on Reporting Frequency Using Annual Data

Reporting Behavior		***COD /DEBT***	***COD /ASSET***	***E2P***	***ROE***	***OPCOST /SALE***	***OPCOST /ASSET***	***SIZE***	***GROWTH***	***ROA***	***ADR***	**LEV**
Semiannual Reporting	*N*	1658	2154	1495	2688	2434	2685	2688	2307	2688	2688	2688
	Mean	0.463	0.011	0.070	–0.133	2.515	0.810	4.501	30.234	–0.048	0.022	0.414
	SD	2.209	0.013	0.071	0.657	9.293	0.736	2.131	315.568	0.225	0.145	0.233
	Q1	0.047	0.002	0.032	–0.177	0.799	0.358	2.853	–2.313	–0.111	0.000	0.229
	Median	0.080	0.006	0.052	0.038	0.897	0.626	4.265	7.063	0.020	0.000	0.403
	Q3	0.156	0.013	0.082	0.138	1.002	1.005	5.931	19.620	0.080	0.000	0.582
Quarterly Quantitative Reporting	*N*	586	762	357	604	797	865	867	769	867	867	867
	Mean	0.979	0.012	0.095	–0.095	2.485	0.775	4.973	134.60	–0.040	0.062	0.471
	SD	4.858	0.013	0.093	0.562	10.072	0.650	2.205	2898.8	0.213	0.242	0.255
	Q1	0.065	0.003	0.044	–0.125	0.792	0.292	3.379	–13.685	–0.087	0.000	0.265
	Median	0.101	0.009	0.074	0.045	0.898	0.647	4.697	1.179	0.014	0.000	0.481
	Q3	0.225	0.018	0.109	0.151	0.981	1.073	6.555	14.879	0.071	0.000	0.640
Quarterly Qualitative Reporting	*N*	2588	3528	1756	2914	4033	4334	4337	3784	4337	4337	4337
	Mean	0.824	0.012	0.086	–0.079	2.390	0.905	4.128	209.49	–0.034	0.014	0.437
	SD	3.800	0.014	0.087	0.545	8.444	0.772	2.046	5497.0	0.220	0.116	0.256
	Q1	0.063	0.002	0.041	–0.119	0.819	0.384	2.578	–5.269	–0.077	0.000	0.254
	Median	0.105	0.007	0.066	0.050	0.910	0.715	3.889	5.894	0.027	0.000	0.430
	Q3	0.235	0.015	0.101	0.142	0.991	1.166	5.387	20.35	0.080	0.000	0.591
Quarterly Voluntary Reporting	*N*	306	382	225	444	408	444	444	388	444	444	444
	Mean	0.477	0.011	0.067	–0.112	1.959	0.787	5.212	4.737	–0.048	0.056	0.464
	SD	2.076	0.013	0.074	0.470	6.167	0.726	2.215	60.30	0.196	0.231	0.223
	Q1	0.044	0.003	0.030	–0.193	0.800	0.312	3.463	–8.757	–0.101	0.000	0.300

Median	0.066	0.008	0.050	0.014	0.900	0.568	4.971	3.262	0.006	0.000	0.456
Q3	0.136	0.014	0.087	0.118	0.991	1.046	6.831	14.293	0.059	0.000	0.634

Table 2, Panels A (Panel B) presents descriptive statistics for the major variables and control variables using quarterly and semiannual data (annual data). The sample period is 2008-2019. *Reporting Behavior* refers to one of four reporting practices: semiannual reporting, quarterly quantitative reporting, quarterly qualitative reporting, or quarterly voluntary reporting. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%.

TABLE 3

Panel A: Comparative Univariate Analysis of Treatment and Control Groups Using Quarterly and Semiannual Data

	Treatment Sample (*MSEMI = 1*)			**Control Sample (*MSEMI = 0*)**			**Difference in Median**	
Variables	N	Mean	Median	N	Mean	Median		
COD/DEBT	2185	0.204	0.037	2715	0.200	0.022	0.015	***
COD/ASSET	2851	0.006	0.003	3404	0.003	0.002	0.001	***
E2P	2062	0.028	0.014	1769	0.027	0.016	–0.002	***
ROE	3608	–0.021	0.014	3262	–0.014	0.012	0.003	
OPCOST/SALE	3262	4.038	1.802	3762	1.980	0.893	0.909	***
OPCOST/ASSET	3599	0.428	0.318	4117	0.190	0.146	0.171	***
SIZE	3608	4.741	4.508	4138	5.330	5.046	–0.538	***
GROWTH	2532	30.417	4.034	3585	168.561	0.000	4.034	***
ROA	3608	–0.021	0.014	4138	–0.014	0.005	0.009	***
ADR	3608	0.025	0.000	4138	0.049	0.000	0.000	***
LEV	3608	0.430	0.434	4138	0.467	0.473	–0.038	***

TABLE 3 – *Continued*

Panel B: Comparative Univariate Analysis of Treatment and Control Groups Using Annual Data

	Treatment Sample (*MSEMI = 1*)			**Control Sample (*MSEMI = 0*)**			**Difference in Median**	
Variables	N	Mean	Median	N	Mean	Median		
COD/DEBT	729	0.313	0.073	715	0.909	0.089	–0.016	***
COD/ASSET	938	0.011	0.007	924	0.013	0.009	–0.002	***
E2P	702	0.073	0.055	464	0.089	0.069	–0.013	***
ROE	1112	–0.065	0.059	808	–0.098	0.041	0.018	
OPCOST/SALE	1020	1.974	0.898	966	2.354	0.892	0.005	
OPCOST/ASSET	1111	0.733	0.610	1054	0.743	0.607	0.004	
SIZE	1112	5.149	4.865	1056	5.116	4.816	0.049	
GROWTH	1010	33.469	5.610	939	110.576	1.734	3.875	***
ROA	1112	–0.014	0.030	1056	–0.042	0.015	0.016	***
ADR	1112	0.040	0.000	1056	0.067	0.000	0.000	***
LEV	1112	0.436	0.440	1056	0.474	0.481	–0.041	***

Table 3, Panels A (Panel B) presents the results of a comparison of univariate tests between treatment and control groups using quarterly and semiannual data (annual data). The sample period is 2008-2019. Wilcoxon rank-sum test is used to test the equality of the median.

***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level. Variables are defined in Appendix A.

TABLE 4

Correlation among the Main Variables

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
(1) COD/DEBT		**0.066**	**0.087**	**-0.073**	0.011	**0.056**	**-0.077**	-0.004	-0.020	-0.009	-0.017
(2) COD/ASSET	**0.079**		**0.137**	**-0.189**	-0.015	**-0.115**	**0.095**	-0.004	**-0.162**	**0.054**	**0.467**
(3) E2P	0.023	**0.129**		**0.262**	**0.082**	0.018	**-0.054**	**0.081**	**0.299**	-0.010	0.002
(4) ROE	**-0.030**	**-0.210**	**0.213**		**-0.160**	**0.037**	**0.328**	0.005	**0.700**	0.020	**-0.030**
(5) OPCOST/SALE	0.009	0.012	**0.033**	**-0.164**		**-0.102**	**-0.164**	-0.002	**-0.300**	0.011	**-0.201**
(6) OPCOST/ASSET	**0.076**	**-0.026**	-0.003	**-0.070**	**-0.048**		**-0.113**	-0.007	**0.096**	**-0.075**	0.386
(7) SIZE	**-0.092**	-0.016	-0.008	**0.294**	**-0.175**	**-0.161**		-0.014	**0.386**	**0.219**	**0.337**
(8) GROWTH	**0.022**	-0.001	**0.028**	-0.009	0.002	**-0.019**	-0.015		-0.012	-0.005	-0.017
(9) ROA	**-0.034**	**-0.128**	**0.170**	**0.745**	**-0.302**	**-0.094**	**0.279**	-0.006		-0.003	**0.135**
(10) ADR	0.001	**0.028**	0.011	-0.010	-0.014	**-0.068**	**0.168**	-0.004	0.001		**0.054**
(11) LEV	**-0.036**	**0.407**	-0.009	-0.007	**-0.213**	**0.331**	**0.371**	**-0.024**	**0.075**	**0.044**	

Table 4 reports the Pearson correlations for the period 2008-2019. Correlation coefficients using annual data (quarterly and semiannual data) appear above (below) the diagonal. Correlations are restricted to full firm-period samples. All the variables are Winsorized at 1% and 99%. Correlations significant at the 10% level or lower are presented in bold. Variables are defined in Appendix A.

TABLE 5

Regression Analyses of Firms' Cost of Debt on Reporting Frequency and Control Variables

Model 1: $DV = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (Industry\ FE) + \varepsilon_t$

Model 2: $DV = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (Year\ FE) + \gamma_4 (Industry\ FE) + \varepsilon_t$

	DV = COD/DEBT				***DV = COD/ASSET***			
	Diff-in-Diff Model		*Pre/Post Model*		*Diff-in-Diff Model*		*Pre/Post Model*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
MSEMIxPOST	0.015 ***	0.010 **			0.001 ***	0.001		
	(18.38)	(2.19)			(13.70)	(0.08)		
POST	–0.009 ***	–0.033 **			–0.001 ***	–0.004		
	(–5.35)	(–4.04) *			(–4.67)	(–5.49)		
ALLSEMI			0.015 ***	0.001			0.001 ***	0.001 **
			(24.23)	(0.08)			(21.12)	(2.23)
SIZE	–0.002 ***	–0.004 **	–0.003 ***	–0.006 ***	0.000 ***	0.001 ***	0.000 ***	0.000 ***
	(–14.25)	(–5.10) *	(–19.69)	(–11.78)	(6.84)	(11.11)	(5.63)	(3.00)
GROWTH	0.000 ***	–0.000	–0.000	–0.000	0.000 *	–0.000 **	0.000	–0.000
	(9.76)	(–0.21)	(–1.32)	(–0.09)	(1.75)	(–2.48)	(1.18)	(–0.52)
ROA	–0.026 ***	–0.099 **	–0.035 ***	–0.066 ***	–0.002 ***	–0.007 ***	–0.002 ***	–0.009 ***
	(–8.48)	(–8.99) *	(–12.32)	(–10.72)	(–8.12)	(–7.62)	(–10.07)	(–11.82)
ADR	0.001	–0.002	0.001	–0.003	0.001 ***	–0.001	0.001 *	0.001 *
	(0.79)	(–0.39)	(0.68)	(–0.68)	(2.89)	(–0.84)	(1.87)	(1.84)
LEV	0.005 ***	0.005	0.007 ***	0.006	0.006 ***	0.018 ***	0.007 ***	0.028 ***
	(3.22)	(0.70)	(4.53)	(1.29)	(38.01)	(23.91)	(3.90)	(43.23)

Adj-R^2	0.39	0.18	0.18	0.13	0.37	0.47	0.33	0.31
#Obs.	4,153	1,376	8,491	4,778	5,152	1,733	10,763	6,216
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included	Included	Included

Table 5 shows the results of multivariate difference-in-difference analyses (model 1) and general pre/post analyses (model 2) of firms' cost of debt on reporting frequency and control variables. The cost of debt is measured by *COD/DEBT* and *COD/ASSET*. *COD/DEBT* is calculated as interest expense deflated by after-tax debt, while *COD/ASSET* is calculated as interest expense scaled by the average total assets of a firm. In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than 2015. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated by robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. The sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 6

Regression Analyses of Firms' Cost of Equity on Reporting Frequency and Control Variables

Model 1: $DV = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (Industry\ FE) + \varepsilon_t$

Model 2: $DV = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (Year\ FE) + \gamma_4 (Industry\ FE) + \varepsilon_t$

	DV = E2P								***DV = ROE***							
	Diff-in-Diff Model				*Pre/Post Model*				*Diff-in-Diff Model*				*Pre/Post Model*			
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Datasets	Quarterly & Semi Data		Annual Data		Quarterly & Semi Data		Annual Data		Quarterly & Semi Data		Annual Data		Quarterly & Semi Data		Annual Data	
MSEMIxPOST	–0.004	***	–0.004						–0.009	***	–0.004	*				
	(–7.69)		(–1.27)						(–15.93)		(–1.79)					
POST	–0.003	***	0.004						–0.003	***	–0.003					
	(–2.97)		(0.60)						(–2.72)		(–0.04)					
ALLSEMI					–0.002	***	–0.003	**					–0.004	***	0.001	
					(–7.00)		(–2.01)						(–11.60)		(0.80)	
SIZE	–0.001	***	–0.002	**	–0.000	***	–0.002	***	0.001	***	0.026	***	0.001	***	0.001	***
	(–5.79)		(–3.95)	*	(–5.22)		(–5.89)		(5.45)		(3.26)		(10.53)		(5.63)	
GROWTH	0.000	***	0.000	**	0.000	***	0.000		–0.000		–0.000		–0.000		0.000	**
	(5.31)		(4.34)	*	(4.98)		(0.62)		(–0.89)		(–0.34)		(–0.96)		(2.65)	
ROA	0.209	***	0.253	**	0.139	***	0.173	***	1.078	***	2.126	***	0.716	***	1.452	***
	(3.20)		(14.67)	*	(6.99)		(19.65)		(12.91)		(12.80)		(93.66)		(44.94)	
ADR	0.004	***	0.009	*	0.004	***	0.013	***	0.001		0.003		0.002	*	0.009	**
	(4.14)		(1.85)		(4.39)		(3.23)		(0.72)		(0.71)		(1.66)		(2.38)	
LEV	0.010	***	0.034	**	0.009	***	0.031	***	0.035	***	–0.056	***	0.021	***	0.010	***
	(9.53)		(5.21)	*	(12.60)		(8.41)		(31.24)		(–4.61)		(27.48)		(34.98)	

Adj-R^2	0.64	0.27	0.40	0.19	0.49	0.49	0.74	0.71
#Obs.	3,311	1,138	6,543	3,683	5,383	1,740	10,721	5,798
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included	Included	Included

Table 6 shows the results of multivariate difference-in-difference analyses (model 1) and general pre/post analyses (model 2) of firms' cost of equity on reporting frequency and control variables. The cost of equity is measured by *E2P* and *ROE*. The *E2P* ratio is calculated as earnings per share divided by the average closing price for each period. When the ratio is negative, I replace *E2P* as missing, following Francis et al. 2005. The *ROE* is estimated as income before interest and taxes divided by shareholders' equity. In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than 2015. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters. In contrast, 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated by robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. The sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 7

Regression Analyses of Firms' Operating Cost on Reporting Frequency and Control Variables

Model 1: $DV = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (Industry\ FE) + \varepsilon_t$

Model 2: $DV = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (Year\ FE) + \gamma_4 (Industry\ FE) + \varepsilon_t$

	DV = OPCOST/SALE				***DV = OPCOST/ASSET***			
	Diff-in-Diff Model		***Pre/Post Model***		***Diff-in-Diff Model***		***Pre/Post Model***	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
MSEMIxPOST	0.090 ***	0.013			0.152 ***	0.070 **		
	(9.13)	(1.44)			(3.16)	(2.48)		
POST	–0.002	–0.002			–0.001	–0.086 *		
	(–0.14)	(–0.11)			(–0.11)	(–1.69)		
ALLSEMI			0.091 ***	0.005			0.171 ***	0.027 **
			(36.98)	(1.53)			(8.43)	(1.97)
SIZE	–0.033 ***	–0.026 ***	–0.038 ***	–0.022 ***	–0.020 ***	–0.066 ***	–0.030 ***	–0.082 ***
	(–29.18)	(–17.09)	(–40.95)	(–31.21)	(–22.62)	(–13.24)	(–6.35)	(–29.20)
GROWTH	0.000 ***	–0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(2.70)	(–1.43)	(1.47)	(0.03)	(0.28)	(1.28)	(0.36)	(0.02)
ROA	–2.691 ***	–0.615 ***	–2.871 ***	–0.615 ***	0.002	0.147 ***	–0.046 ***	0.222 ***
	(–21.17)	(–37.37)	(–12.87)	(7.60)	(0.13)	(2.79)	(–3.82)	(8.19)
ADR	0.048 ***	0.005	0.066 ***	–0.013	0.014	0.041	0.014	–0.011
	(4.15)	(0.37)	(5.59)	(–1.61)	(1.49)	(1.04)	(1.23)	(–0.32)
LEV	0.143 ***	0.106 ***	0.121 ***	0.073 ***	0.250 ***	0.839 ***	0.376 ***	0.986 ***
	(12.93)	(8.11)	(15.11)	(12.40)	(28.94)	(19.39)	(9.89)	(42.86)

Adj-R^2	0.91	0.60	0.90	0.66	0.46	0.39	0.44	0.32
#Obs.	6,039	1,917	13,000	7,172	6,094	1,949	13,089	7,248
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included	Included	Included

Table 7 shows the results of multivariate difference-in-difference analyses (model 1) and general pre/post analyses (model 2) of firms' operating costs on reporting frequency and control variables. Operating costs are measured by *OPCOST/SALE* and *OPCOST/ASSET*. *OPCOST/SALE* represents a firm's operating expenses scaled by total sales, while *OPCOST/ASSET* represents operating expenses scaled by average total assets. In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than 2015. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters. In contrast, 0 illustrates firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated by robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. The sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 8

Panel A: Testing the Assumption of Parallel Trends with Cost of Debt as the Dependent Variable

	DV = COD/DEBT		***DV = COD/ASSET***	
	Column (1)	Column (2)	Column (3)	Column (4)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
Lead_MSEMI	0.000	0.003	–0.000	0.000
	(0.28)	(0.71)	(–0.86)	(0.03)
Lag_MSEMI	–0.001	–0.003	–0.000	–0.001
	(–1.00)	(–0.87)	(–1.15)	(–1.60)
MSEMI_POST	0.016 ***	0.007	0.001 ***	–0.000
	(12.16)	(1.47)	(9.46)	(–0.37)
POST	–0.007 ***	–0.031 ***	–0.001 ***	–0.004
	(–4.85)	(–3.66)	(–7.21)	(–4.31)
Adj-R^2	0.42	0.20	0.37	0.50
#Obs.	4,151	1,374	5,150	1,730
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
Joint significance Test of lead and lag MSEMI	*Not Significant (F=0.59, p=0.55)*	*Not Significant (F=0.58, p=0.56)*	*Not Significant (F=0.91, p=0.40)*	*Not Significant (F=1.29, p=0.28)*

TABLE 8 – *Continued*
Panel B: Test of Parallel Trends Assumption When DV is Cost of Equity

	DV = E2P		***DV = ROE***	
	Column (1)	Column (2)	Column (3)	Column (4)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
Lead_MSEMI	–0.001	–0.005 *	–0.001	–0.003
	(–1.22)	(–1.75)	(–1.00)	(–1.41)
Lag_MSEMI	–0.001 *	0.001	–0.001	0.001
	(–1.76)	(0.24)	(–0.55)	(0.50)
MSEMI_POST	–0.002 ***	–0.002	–0.008 ***	0.002
	(–2.77)	(–0.53)	(–8.35)	(0.92)
POST	–0.002 ***	0.002	–0.003 ***	–0.004
	(–2.81)	(0.27)	(–2.66)	(–0.66)
Adj-R^2	0.63	0.37	0.90	0.73
#Obs.	3,311	1,135	5,381	1,737
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
Joint significance Test of lead and lag MSEMI	*Not Significant (F=2.04, p=0.13)*	*Not Significant (F=1.54, p=0.21)*	*Not Significant (F=0.59, p=0.55)*	*Not Significant (F=1.05, p=0.35)*

TABLE 8 – *Continued*

Panel C: Test of Parallel Trends Assumption When DV is Operating Cost

	DV = OPCOST/SALE		***DV = OPCOST/ASSET***	
	Column (1)	Column (2)	Column (3)	Column (4)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
Lead_MSEMI	0.005	0.002	–0.002	–0.015
	(0.80)	(0.38)	(–0.44)	(–0.82)
Lag_MSEMI	0.015 *	–0.005	–0.010	0.007
	(1.95)	(–0.89)	(–1.61)	(0.33)
MSEMI_POST	0.068 ***	0.001	0.062 ***	0.047 *
	(9.44)	(0.34)	(11.03)	(1.83)
POST	–0.001	0.002	–0.001	–0.051
	(–0.12)	(0.12)	(–0.17)	(–1.06)
Adj-R^2	0.91	0.67	0.47	0.47
#Obs.	6,037	1,913	6,092	1,945
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
Joint significance Test of lead and lag MSEMI	*Not Significant (F=2.05, p=0.12)*	*Not Significant (F=1.14, p=0.32)*	*Not Significant (F=1.31, p=0.26)*	*Not Significant (F=0.37, p=0.69)*

Table 8 (Panels A-C) tests the parallel trends assumption by employing a method examining pre-existing treatment effects through the inclusion of lead (*LEAD_MSEMI*) and lag (*LAG_MSEMI*) variables for the treatment indicator (*MSEMI*). A linear regression model is estimated, regressing the outcome variable on the time variable (*POST*), lead and lag variables of the treatment variable, and an interaction term between the treatment and time variables (*MSEMI_POST*). The coefficients of the lead and lag variables capture potential treatment effects before actual treatment and, if jointly statistically significant, would imply a violation of the parallel trend assumption due to the presence of pre-existing treatment effects. Control variables are omitted for convenience. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated by robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. The sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

ESSAY 3: REPORTING FREQUENCY DYNAMICS: SHAPING CAPITAL ALLOCATION AND INFORMATION ASYMMETRY

I. INTRODUCTION

The dynamic nature of financial markets necessitates the constant evolution of financial reporting practices. One such area that has received scant attention yet holds significant potential ramifications is the frequency of financial reporting and how it influences managerial investment decisions and information asymmetry. Reporting frequency is increasingly recognized by scholars, practitioners, and regulators as a crucial component of corporate accountability and transparency. This study examines how reporting frequency affects managerial capital allocation decisions and information asymmetry.

The decisions made by managers on long-term investments are pivotal to an organization's growth trajectory, influencing key areas such as product innovation, technological progress, market expansion, and competitiveness. Reporting frequency is one such factor that can significantly impact these decisions. On the positive side, increased reporting frequency may enhance managerial decision-making, particularly for long-term investments. More regular financial updates could bolster managers' ability to strategize based on the latest performance data, potentially leading to more efficient capital allocation, enhanced firm value, and possibly boost macroeconomic growth. Some research asserts that frequent and timely reporting promotes disciplined, efficient capital

allocation (Kanodia and Lee 1998; Kanodia 2006; Hillegeist, Kausar, Kraft, and Park 2020).

Conversely, frequent reporting might induce a phenomenon known as "short-termism", where managers prioritize short-term results over long-term strategic initiatives. Some studies suggest that frequent reporting induces myopic investment decisions and a focus on short-term earnings (Bhojraj and Libby 2005; Gigler, Kanodia, Sapra, and Venugopalan 2014; Kraft, Vashishtha, and Venkatachalam 2018). Less frequent reporting may reduce accounting and legal costs associated with reporting, which is particularly beneficial for smaller, resource-constrained firms. A few studies, however, contradict these views, finding no significant effect of reporting frequency changes on investment decisions (Kajüter, Klassmann, and Nienhaus 2019; Nallareddy et al. 2019). Thus, how reporting frequency affects managers' investment decisions is a question open to empirical investigation.

Reporting frequency can also have profound implications for information asymmetry - where one party, typically managers, holds superior information than the other party, usually the investors. Increasing the frequency of financial reporting could potentially reduce this asymmetry by providing stakeholders with more regular updates about the firm's performance. This increased transparency could minimize the opportunity for insider trading, reduce the cost of capital, and generally promote more equitable and efficient markets (Healy, Hutton, and Palepu 1999; Brown and Caylor 2005). It can also empower investors with comprehensive insights into a firm's operations, enabling them to make well-informed decisions. Early research supports the conjecture that frequent reporting reduces information asymmetry (Lundholm 1991; Bushman 1991; Cuijpers and Peek 2010b; Fu,

Kraft, and Zhang 2012b). Conversely, less frequent reporting can amplify information asymmetry, jeopardize market efficiency, and even facilitate potentially fraudulent activities.

A higher frequency of reporting, however, may not necessarily reduce information asymmetry, especially if the reports do not contain new or useful information (Kim and Verrecchia 1991; McNichols and Trueman 1994; Buskirk 2012). This is supported by arguments suggesting that more frequent reporting might inject noise into security prices, possibly skewing perceptions (Mensah and Werner 2008). Gigler and Hemmer (1998) argue that obligatory frequent reporting could potentially dampen managers' motivation to offer voluntary disclosures. Resonating this, Buskirk (2012) observes no significant decrease in information asymmetry between firms reporting sales at increased frequency. Given these considerations, it becomes apparent that research examining how changes in financial reporting frequency impact information asymmetry are not only timely but also of utmost importance.

The European Commission initiated the EU Transparency Directive (TD) to harmonize capital market regulations across the EU. This directive, from 2007, necessitated quarterly Interim Management Statements (IMS). The TD outlines the baseline for regular financial reports and their distribution methods. IMSs must include significant events, transactions, and their implications for the company's financial health, so as to effectively portray the economic standing of the company and its subsidiaries (DTR 4.3). Seven years later, in November of 2014, the FCA proposed abolishing the mandate for firms to issue quarterly IMSs, which fall under FCA's Disclosure and Transparency Rules (DTR). The mandate's removal was enacted into UK law by November 2015 (Pozen,

Nallareddy, and Rajgopal 2017). It is worth noting, however, that the FCA rules do not define the explicit contents of IMSs, including the amount of quantitative data required. This brief period, from 2007 to 2014, which witnessed the introduction and termination of the quarterly reporting system, presents an opportunity to holistically study the effect of reporting frequency on investment behaviors and information asymmetry.

After conducting an in-depth analysis of the Difference-in-Differences (DiD) approach applied to managers' capital allocation decisions, I find that a mandatory shift to semiannual reporting appears to be associated with a notable incremental increase in capital investment. Additionally, when comparing all semiannual reporters (including quarterly qualitative reporters) with quarterly quantitative reporters, I also observe a similar and consistent pattern. Semiannual reporting is accompanied by a significant rise in capital expenditures and investment in fixed assets compared to quarterly quantitative reporting. Overall, the results suggest that transitioning from quarterly quantitative to semiannual reporting significantly affects firms' capital allocation, prompting an uptick in capital expenditures and fixed asset investment. These findings suggest that with reduced reporting frequency, managers can concentrate more on long-term profitability, corroborating earlier studies (Bhojraj and Libby 2005; Kraft et al. 2018). This research also provides empirical support for theories that frequent reporting might cultivate managerial short-termism, leading managers to favor immediate earnings over sustained cash flow (Bhojraj and Libby 2005; Gigler et al. 2014; Kraft et al. 2018).

I then delve into the association between a firm's reporting frequency and its encountered information asymmetry. Through a multifaceted DiD approach, I find a noticeable decrease in bid-ask spread is associated with a mandatory decrease in reporting

frequency. Comparative analysis between semiannual reporting (including quarterly qualitative reporting) and quarterly quantitative reporting also reveals that semiannual reporting is associated with a decrease in information asymmetry, compared to quarterly quantitative reporting. Unexpectedly, my results reveal that decreased reporting frequency can significantly reduce information asymmetry, regardless of the reporting period—semiannual, quarterly, or annual.

This revelation stands in contrast to prevailing studies such as Fu et al. (2012), which posit that increased reporting frequency diminishes information asymmetry. Crucially, my study aligns with the notion that the impact of reporting frequency depends heavily on the quality of the information presented (Kim and Verrecchia 1991; McNichols and Trueman 1994; Van Buskirk 2012). Frequent reporting that lacks novel or valuable information may fail to narrow the information gap, risking an information overload that can distort market perceptions (Mensah and Werner 2008). There also lies the possibility that obligatory frequent reporting can discourage managers from making voluntary disclosures (Gigler and Hemmer 1998; Van Buskirk 2012). Therefore, my findings contest the conventional wisdom that more frequent reporting invariably reduces information asymmetry. These results open fresh avenues of research on the ideal reporting frequency and its relationship with information asymmetry, offering an insightful perspective for regulatory policy debates on financial reporting frequency.

I want to emphasize that while past studies, such as those using Butler et al. (2007) U.S. capital market data from 1951-1974, have provided significant insights into the impact of reporting frequency on market dynamics, they may be hindered by dated data and endogeneity issues (*see* Fu et al. 2012; Kraft et al. 2018; Hillegeist et al. 2020). The value

of these studies is undeniable, yet we must recognize that the data they rely upon is 50 to 70 years old. During this period, capital markets have undergone dramatic transformations.[1] In the era of high-speed internet and sophisticated investors, the market has become more competitive and liquid than ever before. These changes challenge the applicability of findings based on outdated historical data. Therefore, it is imperative we recognize the need for research approaches that reflect modern market conditions, to ensure that our understanding of reporting frequency remains relevant and accurate in the face of evolving market dynamics.

Additionally, I address some of the shortcomings of previous studies. Following the implementation of the quarterly IMS in 2007, some firms (hereafter, quarterly qualitative reporters) only released quarterly qualitative information without providing sales or earnings numbers. While these quarterly qualitative reporters seem to publish their reports quarterly on paper, they actually release only qualitative information during the first and third quarters. In contrast, they publish quantitative information during the second and fourth quarters. The reporting behavior described above is more comparable to semiannual reporting than to quarterly reporting. Researchers using earlier UK data, however, consider quarterly qualitative reporters to be quarterly reporters instead of semiannual (Rahman and Schleicher 2015; Ernstberger et al. 2017; Nallareddy et al. 2019). To address this issue, I first compare quantitative quarterly reporters with mandatory semiannual reporters, excluding the qualitative quarterly reporters. I then compare the quantitative quarterly

[1] The "world's first electronic stock market" NASDAQ was, for example, not founded until February of 1971 (NASDAQ 2021). In 1993, the development of EDGAR enabled more rapid dissemination of information. With the advent of new information channels, such as Yahoo Finance, Facebook, and Twitter, disseminating information has become easier than ever before.

reporters with all semiannual reporters, treating quarterly qualitative reporters as semiannual reporters.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Reporting Frequency and Management Decisions

Frequent reporting encourages short-term results - a viewpoint that suggests higher reporting frequencies could potentially hamper the allocation of resources to long-term projects. Managers, under the burden of short-term expectations, could be inclined to prioritize immediate, quantifiable outcomes over long-term profitability. The focus on near-term objectives might compromise managers' autonomy to invest in growth projects aimed at the future, leading to insufficient investment in the company's potential growth. Conversely, infrequent reporting might foster a more strategic, long-term perspective. Without the pressure for immediate results, managers might have the liberty to invest in projects with deferred, but potentially significant payoffs. This change in focus could bolster investments in long-term, albeit uncertain projects, crucial for the firm's evolution. The downside to less frequent reporting is, however, the possible inefficiency due to a lack of real-time information, which might stifle proactive management actions and optimal resource allocation.

Academic research presents conflicting views on this topic. Some studies infer that frequent reporting induces short-termism, causing managers to sacrifice total cash flow for immediate earnings to meet analyst forecasts (Bhojraj and Libby 2005; Graham et al. 2005; Kraft et al. 2018). Gigler et al. (2014) support this view, suggesting frequent reporting might inadvertently promote myopic investments. In contrast, other scholars propose that

frequent and timely reporting can instill managerial discipline and facilitate efficient capital allocation (Kanodia and Lee 1998; Kanodia 2006; Hillegeist et al. 2020). They argue that richer, timely information reflected in stock prices can guide insightful decisions. Yet, it's worth noting there are studies that contest both views, finding no substantial impact of reporting frequency on investment choices (Nallareddy et al. 2019; Kajüter et al. 2019). These conflicting narratives question the assumed association between reporting frequency and managerial short-termism, demanding further scholarly exploration.

Given the intriguing counter-conjectures, the mixed findings from previous research, and concerns about outdated data and endogeneity, it seems pivotal to reassess the implications of frequent reporting on managerial decisions. The complexity of the discussion prevents me from positing a specific directional prediction, but instead, I offer this alternative hypothesis:

H1: Management long-term investment decisions are associated with the frequency of reporting.

Reporting Frequency and Information Asymmetry

Reporting Frequency plays a substantial role in shaping the information asymmetry that exists between firms and their investors. Information asymmetry occurs when there is an imbalance in the understanding of a firm's financial health and operational performance between investors and the firm's management. When companies report more frequently, they may pierce the veil of information asymmetry, supplying investors with timely and relevant updates. By disseminating information more regularly, firms can empower investors to make more enlightened investment decisions, ultimately fostering a more

efficient market characterized by accurately priced stocks reflective of firms' intrinsic value (Welker 1995; Healy et al. 1999; Brown and Caylor 2005). Moreover, such practice can serve as a deterrent to insider trading and fraudulent activities, as regular information flow allows investors to closely monitor the firm activities. Initial research on disclosure effects posits that public disclosures equalize investors' access to internal information, thereby mitigating information asymmetry (Bushman 1991; Lundholm 1991). These studies lend credence to the notion that frequent reporting grants timely access to information, thereby enlarging the public information pool and shrinking the information gap between insiders and stakeholders. Fu et al. (2012) also present corroborating evidence that higher reporting frequency curtails information asymmetry, based on interim frequency data from 1951 to 1973. Cuijpers and Peek (2010) even suggest that heightened reporting frequency diminishes the allure for investors to seek private information, thereby improving stock liquidity.

Conversely, reduced reporting frequency can widen the information asymmetry between a firm and its investors. This withholding of information potentially affords managers an undue advantage, as they can retain superior knowledge of the business. Such a scenario could lead to market inefficiencies and mispriced stocks. Furthermore, infrequent reporting could inadvertently foster an environment conducive to insider trading and fraudulent activities, as the dearth of information makes the detection of these activities challenging for investors. The superior access to information can be manipulated by managers, potentially exploiting investors' information deficiency to management’s advantage, resulting in detrimental outcomes for investors.

While one might intuitively assume that a higher frequency of reporting would reduce information asymmetry or a lower frequency of reporting would increase the asymmetry, this is not always the case. The effectiveness of frequent reporting hinges on the quality of the information provided (Kim and Verrecchia 1991; Demski and Feltham 1994; McNichols and Trueman 1994; Van Buskirk 2012). Simply put, frequent reporting frequency that fails to convey new or valuable information does not necessarily diminish the information gap. Moreover, there is the potential for an information overload effect, where increased reporting could introduce noise into security prices, potentially distorting market perceptions (Mensah and Werner 2008). This can create an illusion of transparency without genuine benefits, leading to misguided decisions and market inefficiencies. In addition, Gigler and Hemmer (1998) posit that the pressure of obligatory frequent reporting may inadvertently suppress managers' inclination to provide voluntary disclosures. This is further supported by Buskirk (2012), who finds no significant decrease in information asymmetry, even among firms that reported sales more frequently.

These contradictory findings underscore the necessity of a comprehensive reassessment of the impact of reporting frequency on information asymmetry. Given the varying interpretations, outdated data, and endogeneity concerns in previous research, I propose an alternative hypothesis instead of formulating directional predictions, thereby inviting a more nuanced understanding of this complex dynamic:

H2: Information asymmetry is associated with the frequency of reporting.

III. DATA AND METHODOLOGY

Sample Selection

I gather firm data from Compustat Global and Compustat G-Security databases, covering the period 2007 to 2020. However, due to the necessity for a year's worth of lagged data, the empirical analyses focus solely on observations from 2008 onwards. The reporting frequency data is meticulously verified, cross-referencing published financial statements with the Thomson Reuters Eikon database. In line with previous studies (Matsumoto 2002; Cheng and Warfield 2005), observations with SIC codes 4400-4999 and 6000-6999, representing regulated industries, banks, and financial institutions, are excluded. Finally, to maintain consistency and avoid outliers, observations with assets below 1 million GBP are removed, given the use of total assets as a scaling factor (*see* Bryan and Mason 2020; Pacheco-Paredes and Wheatley 2021).

Determination of Reporting Frequency

Sample period 2015-2019

Within the scope of this study, I differentiate firms based on the frequency and content of their disclosures since 2014. Those firms which chose to disclose sales and/or earnings data on a quarterly basis are classified as "voluntary quarterly reporters". These firms have quarterly Interim Management Statements (IMSs) available in the Thomson Reuters Eikon database during this period. They also display distinct earnings or sales figures for each quarter (1^{st}– 4^{th} periods) in the *Compustat Global* database. Firms post-2014 that opted for a semiannual reporting schedule, regardless of whether they provided quantitative or qualitative information, are classified as "mandatory semiannual reporters".

For these firms, semiannual IMSs are present in the Thomson Reuters Eikon database, and their semiannual sales or earnings data in the *Compustat Global* database also align with their reporting frequency (i.e., their 1st period and 2nd period, and/or 3rd period, and 4th period, figures are identical).[2]

Sample period 2008-2014

In the context of this investigation, I identify two distinct categories of firms based on their reporting frequency and the nature of the information disclosed between 2007 and 2014. The first category includes firms disclosing sales and/or earnings information on a quarterly basis. These entities are referred to as "mandatory quarterly quantitative reporting firms". Such firms have quarterly Interim Management Statements (IMSs) listed in the Thomson Reuters Eikon database. Additionally, these firms exhibit distinct sales or earnings figures for each quarter (1st– 4th periods) in the *Compustat Global* database. The second category encompasses firms that disclose qualitative information quarterly, either with or without accompanying sales and/or earnings numbers. These are termed "mandatory quarterly qualitative reporting firms". As with the first category, these firms have quarterly IMSs in the Thomson Reuters Eikon database. However, their sales or earnings numbers in the *Compustat Global* database for 1st and 2nd, and/or 3rd and 4th, are identical, reflecting the qualitative nature of their reporting.

Variable Definitions

I have used three proxies to elucidate the firms' capital allocation decisions or investment patterns. The first proxy, *'CAPEX'*, is capital expenditure scaled by the

[2] For semi-annual or qualitative reporters, the *Compustat Global* database mechanically assigns half of the semi-annual number to each of the quarters making up the semiannual interval.

beginning of the period's total assets. The second, *'GROSSPPE'*, is gross property, plant, and equipment—scaled likewise. *'NETPPE'*, a modification of our second measure, adjusts the gross value of property, plant, and equipment by subtracting accumulated depreciation and amortization expenses, also scaled by the beginning of period total assets. If less frequent reporting mitigates a myopic managerial mindset, then we can expect to see an increase in their investment levels in firms transitioning to this semiannual reporting, as compared to control firms. If this is true, we anticipate positive shifts in *CAPEX*, *GROSSPPE*, and *NETPPE* metrics.[3]

To measure information asymmetry, I use the variable, *'SPREAD'*, following Fu et al.'s (2012) approach. *SPREAD* is derived by initially isolating the difference between the mean high price and the mean low price for the period and subsequently dividing that difference by the average of these mean prices. This, thus, serves as an effective metric to gauge the relative spread between the high and low prices as it represents the bid-ask price differences - a gap between the maximum price a buyer is ready to pay (the bid) and the minimum price a seller is inclined to entertain (the ask). The magnitude of this spread acts as an effective gauge of information asymmetry with a broader spread indicating a higher level of such asymmetry. In situations where asymmetry is elevated, market intermediaries face augmented risk when transacting with informed investors who have access to privileged, confidential information regarding a stock. To mitigate this risk, these intermediaries demand a more substantial margin between the bid and ask prices. In essence, a wider spread signals higher information asymmetry, while a narrower one

[3] The resilience of my findings is evident when alternative measures for investment decisions are utilized. For instance, when using changes in gross PPE and Net PPE, scaled by lagged assets, as dependent variables, the outcomes align qualitatively with my initial results.

indicates lower information asymmetry. Therefore, the bid-ask spread, and information asymmetry are positively correlated - a larger value of *SPREAD* signifies a higher degree of information asymmetry within the market. Such an understanding of bid-ask spread plays a pivotal role in decoding the complexities of information asymmetry in financial markets.

I also control for specific company characteristics that can affect the association of reporting frequency with managers' capital allocation decisions and information asymmetry. *'SIZE'* is used as a control variable for company size, calculated as the log of the firm's total assets at the beginning of the period. *'GROWTH'*, the change in sales scaled by the beginning total assets, controls for company growth. Based on Dechow et al.'s (1998) proposition that performance and measurement errors are positively correlated in traditional estimation models, *'ROA'*, net income divided by the beginning total assets, is used to mitigate measurement errors. To account for the incentives for UK firms cross-listed in the US to report quarterly, the indicator variable *'ADR'* is employed, where a value of 1 signifies a UK firm cross-listed in the US. The variable *'LEV'*, representing total liabilities over total assets, controls for a firm's financial flexibility. Industry-specific fixed effects, which could influence the association of reporting frequency with investment patterns and information asymmetry, are managed through industry dummy variables ('*INDUSTRY FE*'), derived from the first two digits of the SIC code. *'YEAR FE'* is used to control for annual variations in economic conditions.

Model Estimates

My study explores the effects of the shift in reporting frequency on managers' investment decisions and information asymmetry based on a difference-in-difference (DiD) approach and a base pre/post model (*H1-H2*). In the DiD approach, the treatment group consists of firms that mandatorily began reporting semiannually from quarterly quantitative reporting in 2015, following the rule change (post-period), while the control group is comprised of firms that report quarterly quantitatively during the entire sample period. I test *H1-H2* by estimating the following robust regression models:

$$\textbf{Model 1: } DV = \varphi_0 + \varphi_1 (POST*MSEMI)_t + \varphi_2 (POST)_t + \varphi_3 (CONTROL)_{t-1} + \varphi_4 (YEAR\ FE) + \varphi_5 (INDUSTRY\ FE) + \varepsilon_t \quad (1)$$

$$\textbf{Model 2: } DV = \omega_0 + \omega_1 (ALLSEMI)_t + \omega_2 (CONTROL)_{t-1} + \omega_3 (YEAR\ FE) + \omega_4 (INDUSTRY\ FE) + \varepsilon_t \quad (2)$$

In Models 1 and 2, the dependent variable (DV) represents proxies for investment patterns and information asymmetry. I use three proxies to measure the firm's investment patterns: *CAPX*, *GROSSPPE*, and *NETPPE*, while information asymmetry is measured by the variable *SPREAD*. Detailed explanations of all variables are provided in Appendix A. The variable *POST*, a binary indicator, is set to 1 for fiscal years post-2014, and 0 for fiscal years from 2008 through 2014, inclusive. Additionally, I have defined *MSEMI*, another binary indicator, which takes the value of 1 if the reporting period adheres to mandatory semiannual reporting, and 0 if it falls within quarterly quantitative reporting. Likewise, *ALLSEMI* is assigned a value of 1 for semiannual reporting periods, including those with quarterly qualitative reporting, and 0 for periods of quarterly quantitative reporting. The vector *'CONTROL'* includes all variables that I have controlled for in the model, such as

SIZE, GROWTH, ROA, LOSS, ADR, and *LEV*. By using firms that voluntarily adopt quarterly reporting as a control group, I am able to isolate the impact of mandatory semiannual reporting, effectively segregating the often-neglected characteristics that shift following the mandatory adoption of less frequent reporting. All analyses are incorporated using robust regressions to address data with outliers and other types of non-normality. This comprehensive integration of variables allows me to conduct a robust and thorough analysis, facilitating a more nuanced understanding of the effects of reporting frequency on managerial decisions and information asymmetry.

IV. RESULTS

Descriptive Statistics

Table 1 offers an intricate breakdown of firms' reporting patterns, both prior to and following the transition to less frequent reporting. Observations based on annual data appear in Columns 1, 3, 5, and 7; meanwhile, observations based on quarterly and semiannual data appear in Columns 2, 4, 6, and 8. In my examination, I classify reporting behavior into four distinct categories: semiannual, quarterly quantitative, quarterly qualitative, and voluntary quarterly. In the 2008 annual data, there are 134 firm-year observations associated with quarterly quantitative reporting and a larger group of 718 firm-year observations tied to quarterly qualitative reporting. Upon scrutinizing the 2008 quarterly and semiannual data, I note 467 firm-period observations for quarterly quantitative reporting and a more substantial 1467 firm-year observations for quarterly qualitative reporting. Shifting the focus to the 2015 annual data, mandatory semiannual reporting represents 559 firm-year observations, while a smaller proportion of 86 firm-year

observations align with voluntary quantitative quarterly reporting. In the 2015 quarterly and semiannual data, mandatory semiannual reporting makes up 1088 firm-period observations, and voluntary quarterly quantitative reporting encompasses 308 firm-period observations.

< Table 1 >

In Table 2, descriptive statistics are shown for both primary and control variables, where Panel A focuses on quarterly and semiannual data, and Panel B focuses on annual data. In the summary statistics, the reporting behaviors are broken down into semiannual reporting, quarterly reporting, quarterly qualitative reporting, and quarterly voluntary reporting. Focusing on Panel A, which relies on quarterly and semiannual data, the median *CAPEX* is 0.012 for firms that report semiannually, and 0.012 for those reporting quantitatively on a quarterly basis. Firms engaged in quarterly qualitative reporting display a slightly higher median *CAPEX* at 0.013, while those voluntarily adhering to quarterly quantitative reporting exhibit a median *CAPEX* of 0.009. Shifting to Panel B, which presents annual data, I find consistent trends. Semiannual reporting firms, for instance, have a median *CAPEX* of 0.018, while those abiding by quantitative quarterly reporting have a median *CAPEX* of 0.022. Firms reported quarterly qualitatively have a median *CAPEX* of 0.020, and those choosing to voluntarily report quarterly in a quantitative manner have a median *CAPEX* of 0.015.

< Table 2 >

Univariate Analysis

Using quarterly and semiannual data (annual data), Table 3 Panel A (Panel B) illustrates the results of the Comparative Univariate Analysis of Treatment and Control

Groups. In Panel A, based on quarterly and semiannual data, it becomes evident that the treatment group, comprising firms mandated to report semiannually, records markedly higher values for variables such as *CAPEX*, *GROWTH*, *ROA*, and *ADR* (cross-listing). This suggests that firms in the treatment group exhibit more capital expenditure, enhanced growth, superior profitability, and increased cross-listing in the U.S., in contrast to the control group. Meanwhile, they show significantly lower values for *GROSSPPE*, *NETPPE*, *SPREAD*, *SIZE*, and *LEV* (leverage ratio), which suggests a decrease in both gross and net PPE, a narrower bid-ask spread, reduced debt levels, and smaller sizes relative to the control group. Conversely, Panel B, which represents annual data, exhibits a slightly different trend. The treatment group in this case exhibits significantly lower values for *SPREAD* and *LEV*, revealing diminished bid-ask spread and decreased debt levels. The same group, however, manifests significantly enhanced values for *GROWTH*, *ROA*, and *ADR*, which suggests these firms enjoy more robust growth rates, higher profitability, and a heightened presence in overseas markets. These differing observations between Panel A and Panel B could be attributed to the dissimilar data frequencies incorporated in the analysis. The divergent outcomes underscore the significance of considering both data categories while examining the correlation between reporting behavior and financial performance.

< Table 3 >

Correlation

Table 4 provides a visual representation of the Pearson correlation coefficients for all variables, featuring annual data below the diagonal and quarterly and semiannual data above the diagonal, covering the full sample. From an analytical perspective, the

correlation coefficients stemming from the annual, quarterly, and semiannual data show similar trends in their magnitude, direction, and level of statistical significance.

< Table 4 >

Effect of Reporting Frequency on Firm's Investment Patterns:

In this section, I delve into the influence of reporting frequency on investment patterns among firms that mandatorily shift to report semiannually versus those adhering to the voluntary quarterly quantitative reporting, in the period after of the regulatory shift in 2015. The key proposition investigated in this research, as illustrated in Table 5, is whether semiannual reporting mitigates managerial short-termism, consequently fostering more robust investments within the transitioning firms. Indeed, positive surges in investment indicators, namely *CAPEX*, *GROSSPPE*, and *NETPPE*, would corroborate this assumption. In examining the DiD analyses of managers' capital allocation decisions, the primary variable of interest is the interaction term (*POSTxMSEMI*). This term signifies the incremental change in capital investment associated with the mandatory reduction in reporting frequency. Remarkably, irrespective of whether annual, quarterly, or semiannual data are employed, the interaction terms for *CAPEX*, *GROSSPPE*, and *NETPPE* variables consistently exhibit positive and statistically significant coefficients across all firms, indicating a tangible surge in capital expenditure and investment in fixed assets. Consider, for instance, the 0.004 (0.003) coefficient for *CAPEX* under quarterly and semiannual (annual) data. This value translates into a significant economic impact as firms transitioning from quarterly to semiannual reporting witness a 0.4% (0.3%) rise in capital expenditures. Similarly, *NETPPE* exhibits a significantly positive coefficient of 0.020 (0.029), or a 2% (2.9%) increase in net PPE for transitioning firms.

< Table 5 >

Table 6 broadens this view, extending the analysis to encompass the overall effects of reporting frequency shifts on a firm's investment patterns. The variable of interest here is *ALLSEMI*, which represnts the change in investment correlated with a lower reporting frequency. Aligning with the findings from Table 5, the *ALLSEMI* coefficient for *CAPEX* under quarterly and semiannual (annual) data exhibits a positive and statistically significant value of 0.004 (0.002), denoting a 0.4% (0.2%) increase in capital expenditure for semiannual reporters. I find similar results for *GROSSPPE* and *NETPPE*.

These results collectively indicate that the obligatory shift from quarterly to semiannual reporting is associated with firms' capital allocation decisions, as they expand capital expenditures and fixed asset investment. Consequently, the data presented in Tables 5 and 6 lend weight to the conjecture that reduced reporting frequency is associated with enhanced long-term investment. The results support the idea that less frequent reporting allows managers to focus on long-term profitability rather than short-term objectives (Bhojraj and Libby 2005; Kraft et al. 2018).

< Table 6 >

Effect of Frequency of Reporting on Firms' Information Asymmetry

The results presented in Table 7 reveal the association between a firm's reporting frequency and the degree of information asymmetry it experiences, encompassing both a multivariate DiD and a pre/post approach. Information asymmetry is quantified through the variable *'SPREAD'*; a wider spread signifies higher information asymmetry, while a narrower spread suggests the opposite. Should an obligatory shift to semiannual reporting

augment or diminish information asymmetry, the corresponding interaction term (*POSTxMSEMI*) with *SPREAD* is projected to be either positive or negative in DiD test.

< Table 7 >

The DiD analyses shown in Columns 1 and 2 indicate statistically significant negative coefficients for the interaction terms with SPREAD. This indicates that mandatory semiannual reporting results in a decrease in the price gap utilizing quarterly, semiannual, and annual data. To elaborate, using quarterly and semiannual data (annual data), the interaction term has a significant negative coefficient of –0.001 (–0.002) for *SPREAD*. From an economic viewpoint, these findings are consequential. Companies obliged to shift from quantitative quarterly to semiannual reporting exhibit a decrease in the price gap of 0.1% (0.2%) using quarterly and semiannual data (annual data). This suggests that less frequent reporting periods can, in fact, lead to a narrower pricing gap.

An investigation of the overall effects of reporting frequency changes on information asymmetry through a pre/post design is presented in Columns 3 and 4 of Table 7. *ALLSEMI*, a measure of the information asymmetry shift attributable to reduced reporting frequency, is the main variable of interest. A comparison between all semiannual reporters (inclusive of quarterly qualitative reporters) and quarterly quantitative reporters reveals similar outcomes to the DiD analysis in Table 7. In both semiannual, quarterly, and annual data, the coefficients of *ALLSEMI* are negative and statistically significant, indicating that semiannual reporting corresponds with a decrease in the pricing gap relative to quarterly quantitative reporters.

Contrary to the general belief exemplified in studies, such as Fu et al. (2012), my results surprisingly illustrate that reduced reporting frequency can significantly curtail

information asymmetry, irrespective of the specific reporting period—semiannual, quarterly, or annual. This finding indicates that the association of reporting frequency and information asymmetry is not as straightforward as previously thought. An important consideration here is the quality of the information disclosed. If frequent reports lack new or substantial data, they may not effectively bridge the information gap, but, as observed by Mensah and Werner (2008), may lead to an information overload that misshapes market perceptions. Furthermore, the compulsion for frequent reports might dissuade managers from voluntary disclosures, as posited by (Gigler and Hemmer 1998; Buskirk 2012). These findings challenge the conventional belief that increased reporting frequency invariably lessens information asymmetry. This research underscores the need for further exploration into optimal reporting frequency and its association with information asymmetry.

Additional Analyses

To preclude alternative interpretations of my findings, I conduct numerous sensitivity analyses. These assessments facilitated a deeper exploration into whether the outcomes delineated earlier might be swayed by particular specification preferences. To mitigate potential validity risks, I replicated the identical multivariate analyses under an array of constraints.

< Table 8 >

Parallel Assumption Test

In the pursuit of verifying the parallel assumption in my DiD treatment and control groups, I examine on examining whether treatment firms and control firms displayed analogous trends prior to the compulsory frequency modification. This is a critical prerequisite, as the ability to compute the coefficient on the interaction term (*MSEMIxPOST*) hinges on this condition. To scrutinize the assumption of parallel trends,

I adopt a methodology that inspects the existence of antecedent treatment effects. This is accomplished by integrating both lead and lag variables of the treatment indicator into the analysis. More precisely, I devise a lead variable (*LEAD_MSEMI*) that signifies the treatment status one period in advance, and a lag variable (*LAG_MSEMI*) that symbolizes the treatment status one period in arrears.

I then run a linear regression model, where all the dependent variables (i.e., *CAPEX*, *GROSSPPE*, *NETPPE*, and *SPREAD*) are regressed against the time variable (*POST*), the newly created lead and lag variables of the treatment indicator, and an interaction term that links the treatment and time variables (*MSEMI_POST*). These lead and lag coefficients encapsulate potential treatment effects during the intervals preceding the authentic treatment. The conjunction of these coefficients being statistically significant would insinuate a breach of the parallel trends assumption, implying the existence of pre-treatment effects. Table 8, Panels A-B, presents the outcomes of the parallel trends assumption verification. The lack of joint statistical significance in the coefficients of *LEAD_MSEMI* and *LAG_MSEMI* in Panels A and B bolsters the authenticity of the parallel trends assumption in the DiD context. This deduction substantiates that without the intervention of the treatment, the treatment and control groups would have adhered to analogous trajectories. This concurrence facilitates the credible estimation of the treatment's causal impact on the outcome variable.

Alternative Statistical Tests

The primary analysis leverages robust regressions to handle potential outliers and non-normal distributions in the dataset. To preemptively negate the possible influence of these statistical methods (namely, robust regression) on the core conclusions, I employ alternative statistical techniques, reassessing Models 1 and 2, and verifying results across

all variables. Initially, I use Ordinary Least Squares (OLS), integrating firm-specific clustered standard errors to compensate for heteroscedasticity and observation clustering. As a subsequent alternate strategy, high-dimensional fixed effects models are implemented to counter unobserved heterogeneity, thereby augmenting the accuracy of estimates pertaining to alterations in reporting frequency. The outcomes, while not reported, align qualitatively with the primary findings.

V. CONCLUSION

In the study I test and find that the mandatory shift from quarterly to semiannual reporting has considerable positive effects on firms' capital allocation decisions, driving firms to expand capital expenditures and fixed asset investment. The results herein contribute significantly to existing accounting research, by showing that reporting frequency has a considerable influence on capital allocation decisions. This reinforces the hypothesis that less frequent reporting might enable managerial emphasis on long-term profitability over short-term gains. This paradigm shift towards more sustainable business development could revolutionize current accounting practices and frameworks, making this research invaluable for both accounting academics and practitioners. Furthermore, the findings can guide policy decisions regarding financial reporting frequency, suggesting a potential tool to promote long-term corporate investment. Furthermore, regulators may leverage these insights to frame policies that encourage sustainable business growth while maintaining necessary transparency and compliance.

These findings substantially contribute to the field of accounting research, specifically the literature on reporting frequency and its impact on corporate decision-

making. They underscore the potential unintended effects of regulatory changes on firm behavior and broaden our understanding of how financial reporting systems can encourage or hinder investment patterns. Ultimately, these results prompt the reconsideration of the ideal balance between the benefits of frequent disclosure for market transparency and the potential managerial short-termism it can induce.

The study also finds that decreased reporting frequency can significantly reduce information asymmetry, regardless of the reporting period—semiannual, quarterly, or annual. It suggests that frequency is less significant than the quality of the information provided. Frequent reporting with insufficiently valuable information could widen the information gap, potentially creating an information overload that confuses market perceptions. These results thus run counter to the conventional view that increased reporting frequency invariably reduces information asymmetry. Instead, they suggest that the impact of reporting frequency on information asymmetry is a more complex, nuanced dynamic that warrants further study. These results lay a fresh groundwork for investigating optimal reporting frequency and its link to information asymmetry, providing valuable insights for future policy.

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APPENDIX A

Variables	Descriptions
CAPEX	Capital expenditure scaled by the beginning of the period's total assets;
GROSSPPE	Gross Property, Plant and Equipment scaled by the beginning of the period's total assets;
NETPPE	Gross Property, Plant and Equipment minus Depreciation and Amortization scaled by the beginning of the period's total assets;
SPREAD	A proxy for information asymmetry, calculated as initially isolating the difference between the mean high price and the mean low price and subsequently dividing by the average of these mean prices;
POST	An indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than or equal to 2014;
MSEMI	*MSEMI* is an indicator variable equal to 1 if the reporting period corresponds to mandatory Semiannual reporting (twice a year) and 0 if the reporting period corresponds to quarterly quantitative reporting (four times a year);
ALLSEMI	An indicator variable, in which 1 represents firms reporting quantitatively twice a year, is labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1).
SIZE	Natural log of beginning-of-period total assets of the firm to control for size differences;
GROWTH	The change in sales scaled by beginning-of-period total assets to control for growth;
ROA	Return on asset (Net income scaled by beginning-of-period total assets);
ADR	An indicator variable equal to 1 if U.K. firms cross-listed in the U.S.; and 0 otherwise;
LEV	*LEV* represents leverage calculated as total liabilities ÷ total assets;
Quarterly Quantitative	Mandatory Quarterly Quantitative Reporting, an indicator variable equal to 1 if the reporting period is greater than 2007 and less than 2015 and the firm discloses sales and earnings information at the quarterly frequency; and 0, otherwise;
Quarterly Qualitative	Mandatory Quarterly Qualitative Reporting, an indicator variable equal to 1 if the reporting period is greater than 2007 and less than 2015 but the firm does not disclose sales and earnings information at the quarterly frequency; and 0, otherwise;
Quarterly Voluntary	Voluntary Quarterly Quantitative Reporting, an indicator variable equal to 1 if the reporting period is greater than 2014 and the firm voluntarily discloses sales and earnings information at the quarterly frequency; and 0, otherwise;
Semiannual	Mandatory Semiannual Reporting, an indicator variable equal to 1 if the reporting period is greater than 2014 and the firm mandatorily discloses sales and earnings information twice a year; and 0, otherwise;

TABLE 1
Sample Distribution by Year and Reporting Behavior

	Reporting Behavior	***Quarterly Quantitative Reporting***		***Quarterly Qualitative Reporting***		***Semiannual Reporting***		***Quarterly Voluntary Reporting***	
		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
		Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data
Before									
	2008	134	467	718	1467	.	.	.	.
	2009	129	450	705	1318	.	.	.	.
	2010	127	383	642	1139	.	.	.	.
	2011	116	339	619	1097	.	.	.	.
	2012	184	620	488	899	.	.	.	.
	2013	115	415	560	985	.	.	.	.
	2014	62	237	605	1126	.	.	.	.
After									
	2015	.	.	.	.	559	1088	86	304
	2016	.	.	.	.	541	1013	86	291
	2017	.	.	.	.	537	991	99	413
	2018	.	.	.	.	519	983	114	449
	2019	.	.	.	.	532	993	59	249

Table 1 describes the annual number of observations based on firms' reporting Behavior before and after the start of less frequent reporting. Columns 1, 3, 5, and 7 (columns 2,4,6 and 8) represent the number of observations for each year based on annual data (quarterly and semiannual data). *Reporting Behavior* refers to one of four reporting practices: semiannual reporting, quarterly quantitative reporting, quarterly qualitative reporting, or quarterly voluntary reporting. Variables are defined in Appendix A.

TABLE 2

Panel A: Descriptive Statistics on Reporting Frequency Using Quarterly and Semiannual Data

Reporting Behavior		***CAPEX***	***GROSSPPE***	***NETPPE***	***SPREAD***	***SIZE***	***GROWTH***	***ROA***	***ADR***	***LEV***
Semiannual Reporting	N	4655	4883	4883	4904	5068	3477	5068	5068	5068
	Mean	0.026	0.200	0.190	0.041	4.498	32.684	–0.039	0.020	0.409
	SD	0.038	0.239	0.238	0.030	2.255	443.81	0.201	0.138	0.237
	Q1	0.004	0.032	0.021	0.022	2.763	–5.164	–0.060	0.000	0.214
	Median	0.012	0.092	0.083	0.031	4.261	4.706	0.009	0.000	0.397
	Q3	0.032	0.278	0.268	0.050	5.995	16.664	0.038	0.000	0.583
Quarterly Quantitative Reporting	N	2803	2879	2879	1816	2911	2499	2911	2911	2911
	Mean	0.031	0.241	0.232	0.044	5.242	166.376	–0.016	0.041	0.464
	SD	0.050	0.251	0.249	0.033	2.453	4448.23	0.147	0.197	0.262
	Q1	0.005	0.046	0.038	0.023	3.419	–5.481	–0.018	0.000	0.261
	Median	0.012	0.139	0.130	0.033	4.975	0.000	0.005	0.000	0.468
	Q3	0.033	0.363	0.350	0.052	6.981	9.678	0.019	0.000	0.640
Quarterly Qualitative Reporting	N	7635	7898	7898	4953	8031	5635	8031	8031	8031
	Mean	0.031	0.197	0.188	0.046	4.104	31.457	–0.034	0.011	0.434
	SD	0.049	0.232	0.230	0.036	2.115	522.12	0.205	0.104	0.262
	Q1	0.005	0.032	0.024	0.023	2.515	–7.328	–0.045	0.000	0.241
	Median	0.013	0.090	0.081	0.035	3.886	2.871	0.011	0.000	0.430
	Q3	0.034	0.288	0.276	0.056	5.393	14.835	0.037	0.000	0.595
Quarterly Voluntary Reporting	N	1613	1691	1691	1557	1706	1501	1706	1706	1706
	Mean	0.021	0.202	0.192	0.037	5.362	154.066	-0.008	0.057	0.478
	SD	0.031	0.252	0.249	0.024	2.374	3732.93	0.054	0.232	0.238
	Q1	0.003	0.030	0.021	0.022	3.450	–3.241	–0.020	0.000	0.297
	Median	0.009	0.087	0.074	0.030	5.040	0.004	0.003	0.000	0.483

	Q3	0.023	0.272	0.260	0.045	7.052	9.409	0.016	0.000	0.675

TABLE 2 – *Continued*

Panel B: Descriptive Statistics on Reporting Frequency Using Annual Data

Reporting Behavior		***CAPEX***	***GROSSPPE***	***NETPPE***	***SPREAD***	***SIZE***	***GROWTH***	***ROA***	***ADR***	**LEV**
Semiannual Reporting	*N*	2538	2688	2688	2648	2688	2307	2688	2688	2688
	Mean	0.038	0.238	0.198	0.040	4.501	30.234	–0.048	0.022	0.414
	SD	0.056	0.272	0.261	0.026	2.131	315.568	0.225	0.145	0.233
	Q1	0.007	0.051	0.021	0.023	2.853	–2.313	–0.111	0.000	0.229
	Median	0.018	0.128	0.082	0.032	4.265	7.063	0.020	0.000	0.403
	Q3	0.045	0.325	0.281	0.048	5.931	19.620	0.080	0.000	0.582
Quarterly Quantitative Reporting	*N*	841	867	867	596	867	769	867	867	867
	Mean	0.052	0.266	0.229	0.045	4.973	134.609	–0.040	0.062	0.471
	SD	0.082	0.292	0.282	0.031	2.205	2898.89	0.213	0.242	0.255
	Q1	0.009	0.063	0.034	0.025	3.379	–13.685	–0.087	0.000	0.265
	Median	0.022	0.157	0.112	0.035	4.697	1.179	0.014	0.000	0.481
	Q3	0.060	0.358	0.314	0.053	6.555	14.879	0.071	0.000	0.640
Quarterly Qualitative Reporting	*N*	4206	4337	4337	2860	4337	3784	4337	4337	4337
	Mean	0.047	0.240	0.204	0.046	4.128	209.490	–0.034	0.014	0.437
	SD	0.075	0.272	0.262	0.032	2.046	5497.07	0.220	0.116	0.256
	Q1	0.008	0.052	0.026	0.025	2.578	–5.269	–0.077	0.000	0.254
	Median	0.020	0.127	0.083	0.036	3.889	5.894	0.027	0.000	0.430
	Q3	0.051	0.336	0.287	0.058	5.387	20.350	0.080	0.000	0.591
Quarterly Voluntary Reporting	*N*	432	444	444	438	444	388	444	444	444
	Mean	0.035	0.228	0.187	0.037	5.212	4.737	–0.048	0.056	0.464
	SD	0.050	0.276	0.263	0.021	2.215	60.300	0.196	0.231	0.223
	Q1	0.006	0.049	0.018	0.023	3.463	–8.757	–0.101	0.000	0.300

Median	0.015	0.109	0.066	0.031	4.971	3.262	0.006	0.000	0.456
Q3	0.043	0.292	0.238	0.043	6.831	14.293	0.059	0.000	0.634

Table 2, Panels A (Panel B) presents descriptive statistics for the major variables and control variables using quarterly and semiannual data (annual data). The sample period is 2008-2019. *Reporting Behavior* refers to one of four reporting practices: semiannual reporting, quarterly quantitative reporting, quarterly qualitative reporting, or quarterly voluntary reporting. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%.

TABLE 3

Panel A: Comparative Univariate Analysis of Treatment and Control Groups Using Quarterly and Semiannual Data

	Treatment Sample (*MSEMI = 1*)			**Control Sample (*MSEMI = 0*)**			**Difference in Median**	
Variables	N	Mean	Median	N	Mean	Median		
CAPEX	3324	0.026	0.013	3967	0.028	0.011	0.002	***
GROSSPPE	3471	0.214	0.108	4097	0.229	0.117	–0.009	***
NETPPE	3471	0.205	0.097	4097	0.220	0.106	–0.009	***
SPREAD	3480	0.040	0.031	2984	0.041	0.032	–0.001	**
SIZE	3608	4.741	4.508	4138	5.330	5.046	–0.538	***
GROWTH	2532	30.417	4.034	3585	168.56	0.000	4.034	***
ROA	3608	–0.021	0.014	4138	–0.014	0.005	0.009	***
ADR	3608	0.025	0.000	4138	0.049	0.000	0.000	***
LEV	3608	0.430	0.434	4138	0.467	0.473	–0.038	***

TABLE 3 – *Continued*

Panel B: Comparative Univariate Analysis of Treatment and Control Groups Using Annual Data

	Treatment Sample (*MSEMI = 1*)			**Control Sample (*MSEMI = 0*)**			**Difference in Median**	
Variables	N	Mean	Median	N	Mean	Median		
CAPEX	1039	0.037	0.021	1022	0.049	0.021	0.000	
GROSSPPE	1112	0.254	0.145	1056	0.261	0.141	0.004	
NETPPE	1112	0.218	0.099	1056	0.223	0.094	0.005	
SPREAD	1103	0.038	0.029	795	0.043	0.033	–0.004	***
SIZE	1112	5.149	4.865	1056	5.116	4.816	0.049	
GROWTH	1010	33.469	5.610	939	110.57	1.734	3.875	***
ROA	1112	–0.014	0.030	1056	–0.042	0.015	0.016	***
ADR	1112	0.040	0.000	1056	0.067	0.000	0.000	***
LEV	1112	0.436	0.440	1056	0.474	0.481	–0.041	***

Table 3, Panels A (Panel B) presents the results of a comparison of univariate tests between treatment and control groups using quarterly and semiannual data (annual data). The sample period is 2008-2019. Wilcoxon rank-sum test is used to test the equality of the median.

***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level. Variables are defined in Appendix A.

TABLE 4

Correlation among the Main Variables

	(1)	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***	***(7)***	***(8)***	***(9)***
(1) CAPEX		**0.99**	**-0.08**	**0.29**	0.02	**0.13**	**0.08**	**0.14**	-0.03
(2) GROSSPPE	**0.48**		**-0.07**	**0.28**	0.01	**0.13**	**0.08**	**0.12**	**0.14**
(3) NETPPE	**0.48**	**1.00**		**-0.47**	0.02	**-0.35**	**-0.08**	**-0.19**	**0.12**
(4) SPRAED	**0.03**	**-0.03**	**-0.03**		-0.01	**0.39**	**0.22**	**0.34**	**-0.19**
(5) SIZE	**0.07**	**0.27**	**0.28**	**-0.42**		-0.01	0.00	-0.02	**0.34**
(6) GROWTH	0.00	0.00	0.00	**0.03**	-0.01		0.00	**0.13**	-0.02
(7) ROA	**-0.06**	**0.06**	**0.07**	**-0.25**	**0.28**	-0.01		0.05	**0.13**
(8) ADR	-0.01	**0.06**	**0.06**	**-0.07**	**0.17**	0.00	0.00		**0.05**
(9) LEV	**-0.02**	**0.13**	**0.13**	**-0.18**	**0.37**	**-0.02**	**0.07**	**0.04**	

Table 4 reports the Pearson correlations for the period 2008-2019. Correlation coefficients using annual data (quarterly and semiannual data) appear above (below) the diagonal. Correlations are restricted to full firm-period samples. All the variables are Winsorized at 1% and 99%. Correlations significant at the 10% level or lower are presented in bold. Variables are defined in Appendix A.

TABLE 5

Investments Behaviors: Cross-Sectional Difference-in-Differences Perspective on Treatment versus Control Samples

Model 1: $DV = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (Industry\ FE) + \varepsilon_t$

	DV = CAPEX		***DV = GROSSPPE***		***DV = NETPPE***	
	(1)	(2)	(3)	(4)	(5)	(6)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
MSEMIxPOST	0.004 ***	0.003 *	0.021 ***	0.031 ***	0.020 ***	0.029 ***
	(8.80)	(1.68)	(5.31)	(2.95)	(5.16)	(3.35)
POST	–0.001	–0.006 **	–0.016 **	–0.033 *	–0.012 *	–0.035 **
	(–0.57)	(–2.08)	(–2.09)	(–1.85)	(–1.70)	(–2.36)
SIZE	0.001 ***	0.002 ***	0.004 ***	0.002	0.003 ***	–0.000
	(10.04)	(6.25)	(5.74)	(0.77)	(4.66)	(–0.19)
GROWTH	0.000 ***	0.000 ***	–0.000 *	0.000 ***	–0.000 **	–0.000
	(2.55)	(8.00)	(–1.65)	(7.96)	(–2.54)	(–0.69)
ROA	0.009 ***	0.015 ***	0.054 ***	0.127 ***	0.071 ***	0.133 ***
	(5.14)	(5.24)	(4.13)	(6.50)	(5.52)	(8.00)
ADR	0.000	0.002	–0.035 ***	–0.019	–0.034 ***	–0.029 **
	(0.11)	(1.13)	(–4.56)	(–1.34)	(–4.61)	(–2.34)
LEV	0.001	0.002	0.065 ***	0.115 ***	0.070 ***	0.105 ***
	(1.64)	(0.76)	(9.12)	(6.99)	(9.93)	(7.51)
R^2	0.25	0.34	0.79	0.72	0.79	0.78
#Obs.	5,976	1,903	6,079	1,948	6,079	1,948
Year FE	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included

Table 4 shows the results of multivariate difference-in-difference analyses of a firm's investment patterns on reporting frequency. Capital investment is measured by *CAPEX*, *GROSSPPE*, and *NETPPE*. In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if fiscal year is greater than 2014; and 0 if fiscal year is greater than 2007 and less than 2015. *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. Sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 6

Investment Behaviors under Different Reporting Frequencies: Cross-Sectional Pre/Post Analysis

Model 2: $DV = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (YEAR\ FE) + \gamma_4 (INDUSTRY\ FE) + \varepsilon_t$

	DV = CAPEX		***DV = GROSSPPE***		***DV = NETPPE***	
	(1)	(2)	(3)	(4)	(5)	(6)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
AllSEMI	0.004 ***	0.002 **	0.004 **	0.017 ***	0.005 **	0.013 ***
	(14.72)	(2.30)	(2.37)	(4.07)	(2.31)	(3.81)
SIZE	0.001 ***	0.003 ***	0.006 ***	0.008 ***	0.006 ***	0.005 ***
	(17.65)	(18.01)	(13.14)	(8.49)	(13.17)	(7.62)
GROWTH	0.000 *	0.000 *	–0.000 ***	–0.000	–0.000 ***	–0.000
	(1.91)	(1.74)	(–8.00)	(–0.42)	(–8.24)	(–1.04)
ROA	0.005 ***	0.009 ***	0.043 ***	–0.079 ***	0.048 ***	0.080 ***
	(4.63)	(6.46)	(6.04)	(–8.97)	(7.02)	(11.08)
ADR	0.000	0.004 **	–0.035 ***	–0.026 ***	–0.035 ***	–0.028 ***
	(0.15)	(2.51)	(–5.34)	(–2.46)	(–5.65)	(–3.18)
LEV	0.001 **	0.004 ***	0.061 ***	0.087 ***	0.057 ***	0.071 ***
	(2.44)	(3.43)	(13.72)	(11.52)	(13.37)	(11.48)
R^2	0.22	0.21	0.77	0.68	0.79	0.76
#Obs.	12,782	7,127	13,039	7,248	13,039	7,248
Year FE	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included

Table 5 shows the results of how the shift in reporting frequency affects firm's investment patterns. Capital investment is measured by *CAPEX*, *GROSSPPE*, and *NETPPE*. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with t-statistics in parentheses that are calculated robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. Sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 7

Information Asymmetry under Different Reporting Frequencies: Evaluating Cross-Sectional Differences via Difference-in-Differences and Pre/Post Analysis

Model 1: $SPREAD = \beta_0 + \beta_1 (POST)_t + \beta_2 (POSTxMSEMI)_t + \beta_3 (CONTROL)_{t-1} + \beta_4 (Year\ FE) + \beta_5 (Industry\ FE) + \varepsilon_t$

Model 2: $SPREAD = \gamma_0 + \gamma_1 (AllSEMI)_t + \gamma_2 (CONTROL)_{t-1} + \gamma_3 (Year\ FE) + \gamma_4 (Industry\ FE) + \varepsilon_t$

DV = SPREAD

	Diff-in-Diff Model		*Pre/Post Model*	
	(1)	(2)	(3)	(4)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
MSEMIxPOST	–0.001 **	–0.002 **		
	(–2.15)	(–2.01)		
POST	0.001	–0.001		
	(0.67)	(–0.69)		
ALLSEMI			–0.001 ***	–0.001 **
			(–2.73)	(–2.48)
SIZE	–0.002 ***	–0.003	–0.002 ***	–0.003 ***
	(–19.73)	(–14.93)	(–25.13)	(–22.81)

GROWTH	0.000	***	0.000	***	0.000	***	0.000	**
	(5.93)		(3.75)		(5.39)		(2.13)	
ROA	–0.041		–0.027	***	–0.032	***	–0.025	***
	(–21.11)		(–14.26)		(–27.17)		(–23.68)	
ADR	–0.003	***	0.000		–0.001		–0.001	
	(–2.87)		(0.04)		(–1.11)		(–0.36)	
LEV	–0.004	***	0.003	**	–0.002	**	–0.001	
	(–4.68)		(2.12)		(–2.25)		(–0.78)	
Adj-R^2	0.26		0.48		0.27		0.34	
#Obs.	5,043		1,721		10,127		5,732	
Year FE	Included		Included		Included		Included	
Industry FE	Included		Included		Included		Included	

Table 5 shows the results of multivariate difference-in-difference analyses (model 1) and general pre/post analyses (model 2) of a firm's information asymmetry on reporting frequency and control variables. Information asymmetry is measured by the variable *SPREAD*. In the diff-in-diff approach, the treatment firms are those that report semiannually (twice a year) after the rule change was implemented (post-period) in 2015, while control firms report quarterly quantitatively throughout the sample period. *MSEMI* is the treatment indicator variable equal to 1 if the reporting period corresponds to mandatory semiannual reporting; and 0 if the reporting period corresponds to quarterly quantitative reporting. *POST* is an indicator variable equal to 1 if the fiscal year is greater than 2014; and 0 if the fiscal year is greater than 2007 and less than 2015. The variable *ALLSEMI* is an indicator variable, in which 1 represents firms reporting quantitatively twice a year, labeled semiannual reporters, while 0 represents firms reporting quantitatively four times a year, labeled quarterly quantitative reporters. Based on their reporting behavior, quarterly qualitative reporters are considered semiannual reporters (*ALLSEMI* = 1). *CONTROL* is a control vector representing all the following control variables: *SIZE*, *GROWTH*, *ROA*, *ADR*, and *LEV*. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated by robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. The sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

TABLE 8

Panel A: Testing the Assumption of Parallel Trends with Capital Investment Proxies as the Dependent Variables

	DV = CAPEX		***DV = GROSSPPE***		***DV = NETPPE***	
	Column (1)	Column (2)	Column (3)	Column (4)	Column (1)	Column (2)
Datasets	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data	Quarterly & Semi Data	Annual Data
LEAD_MSEMI	0.001	0.001	0.004	0.010	0.003	0.012 *
	(1.04)	(0.51)	(1.06)	(1.40)	(1.02)	(1.76)
LAG_MSEMI	–0.005 ***	0.001	–0.001	0.004	0.001	0.005
	(–7.51)	(0.73)	(–0.23)	(0.47)	(0.23)	(0.86)
MSEMI_POST	0.007 ***	0.002	0.019 ***	0.028 **	0.016 **	0.026 ***
	(9.61)	(1.51)	(3.00)	(2.67)	(2.63)	(2.95)
POST	–0.001	–0.005 **	–0.017 ***	–0.036 *	–0.013 *	–0.037 **
	(–1.22)	(–2.04)	(–2.16)	(–1.88)	(–1.76)	(–2.27)
Adj-R^2	0.26	0.34	0.79	0.72	0.79	0.78
#Obs.	5,974	1,899	6,077	1,944	6,077	1,944
Controls	Included	Included	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included
Joint significance Test of lead and lag MSEMI	*Not Significant (F=1.90, p=0.15)*	*Not Significant (F=0.44, p=0.64)*	*Not Significant (F=0.64, p=0.52)*	*Not Significant (F=1.18, p=0.30)*	*Not Significant (F=0.52, p=0.59)*	*Not Significant (F=2.10, p=0.12)*

TABLE 8 – *Continued*

Panel B: Testing the Assumption of Parallel Trends with Information Asymmetry Proxy as the Dependent Variable

	DV = SPREAD	
	Column (1)	Column (2)
Datasets	Quarterly & Semi Data	Annual Data
LEAD_MSEMI	–0.001	–0.000
	(–1.52)	(–0.42)
LAG_MSEMI	–0.001	–0.001
	(–1.26)	(–0.71)
MSEMI_POST	–0.001	–0.002 *
	(–0.58)	(–1.78)
POST	0.000	0.001
	(0.17)	(0.70)
Adj-R^2	0.24	0.48
#Obs.	5,042	1,718
Controls	Included	Included
Year FE	Included	Included
Industry FE	Included	Included
Joint significance Test of lead and lag MSEMI	*Not Significant (F=1.72, p=0.17)*	*Not Significant (F=0.38, p=0.68)*

Table 8 (Panels A-B) tests the parallel trends assumption by employing a method examining pre-existing treatment effects through the inclusion of lead (*LEAD_MSEMI*) and lag (*LAG_MSEMI*) variables for the treatment indicator (*MSEMI*). A linear regression model is estimated, regressing the outcome variable on the time variable (*POST*), lead and lag variables of the treatment variable, and an interaction term between the treatment and time variables (*MSEMI_POST*). The coefficients of the lead and lag variables capture potential treatment effects before actual treatment and, if jointly statistically significant, would imply a violation of the parallel trend assumption due to the presence of pre-existing treatment effects. Control variables are omitted for convenience. Numbers reported are regression coefficients with *t*-statistics in parentheses that are calculated by robust regression to deal with outliers and other types of non-normality in the data. Variables are defined in Appendix A. All the variables are Winsorized at 1% and 99%. The sample period is 2008–2019. ***Significant at 1% level, **Significant at 5% level, and *Significant at 10% level.

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