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The effect of voluntary international financial reporting standards adoption on information asymmetry in the stock market: Evidence from Japan

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ABSTRACT

This study investigates how voluntary International Financial Reporting Standards (IFRS) adoption impacts information asymmetry in the stock market. We analyze data from firms in Japan, where local accounting standards have substantially converged with IFRS but are more rules-based than principles-based IFRS. These different implementation approaches allow us to investigate how increased accounting flexibility influences recognition and measurement practices, attenuating the effects of accounting standard differences on the level of accounting rule existence or non-existence. We find that information asymmetry increases after voluntary IFRS adoption, which is driven by small- and medium-sized IFRS adopters' decrease in earnings quality after voluntary IFRS adoption. Additional analyses reveal that firms' reporting incentives and accounting resources influence these changes. These results suggest that IFRS's increased accounting flexibility in recognition and measurement practices worsens the information environments of firms with weak incentives to commit to transparent financial reporting or fewer accounting resources (i.e., small- and medium-sized firms).

1. Introduction

As International Financial Reporting Standards (IFRS) are intended to provide investors with information that enables them to make better investment decisions, information asymmetry in stock markets is a critical potential consequence of IFRS adoption. IFRS adoption worldwide is either voluntary or mandatory. Since the 2005 mandatory adoption for firms listed in EU countries, extensive research has been conducted on the effects of mandatory IFRS adoption. However, voluntary IFRS adoption effects are relatively under-researched, especially in recent years (De George et al., 2016; Leuz and Wysocki, 2016). Understanding the effects of voluntary adoption is also important because a non-trivial number of countries either allow voluntary IFRS adoption or prohibit IFRS adoption (Song and Trimble, 2022). As of 2019, 11 % (22) of 195 countries/territories permit IFRS adoption and 6 % (11) presently prohibit it, although the latter could permit voluntary adoption in the future. This study attempts to further our understanding of how voluntary IFRS adoption affects information asymmetry in stock markets.

Prior research provides mixed evidence on the stock market consequences of voluntary IFRS adoption. Early studies on this topic

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focus on Germany, where local accounting standards are substantially different from IFRS. These studies provide evidence suggesting that voluntary adopters exhibit lower information asymmetry in the stock market compared to non-adopters (Gassen and Sellhorn, 2006; Leuz and Verrecchia, 2000). However, in international comparisons, Daske et al. (2008) use two proxies for differences between local accounting standards and IFRS and report inconsistent liquidity effect results. Specifically, they observe no change in liquidity after voluntary IFRS adoption in countries with small differences between local generally accepted accounting principles (GAAP) and IFRS, but a decrease in liquidity in countries with IFRS convergence processes. Therefore, how voluntary IFRS adoption affects information asymmetry in stock markets in countries whose accounting standard differences from IFRS are relatively small remains unclear. This study aims to extend this line of research.

Our study differs at least in two respects from Daske et al. (2008), who investigate voluntary IFRS adopters in countries whose local accounting standards are relatively similar to IFRS. First, we focus on a single country, contrary to Daske et al.'s (2008) use of an international sample. Focusing on voluntary IFRS adoption in a single country enables us to identify differences between IFRS and local accounting standards and helps us better understand which differences have stock market consequences. Daske et al. (2008) measure differences between local accounting standards and IFRS using Bae et al. (2008) scores, which primarily identify differences based on the existence or non-existence of 21 accounting rules (accounting rule differences).[1] However, accounting practices are also determined by other accounting standard aspects, such as the existence of specific criteria, "bright-line" thresholds, and related accounting rule implementation guidance (implementation approach differences). Considering both accounting rule and implementation approach differences, Daske et al.'s (2008) focus on accounting rule differences as accounting standards differences may have resulted in their inconsistent results for voluntary adopters in countries whose local accounting standards differ only slightly from IFRS; this is because implementation approach differences could also affect the stock market consequences of IFRS adoption. We exploit the situation in Japan, where the local accounting standards have high convergence with IFRS but apply a rules-based approach in the implementation process rather than IFRS's principles-based approach. Based on Daske et al.'s (2008) criteria, Japan can be classified as having small accounting standard differences with IFRS because it has promoted convergence, and its standards are evaluated as IFRS equivalent by the Committee of European Securities Regulators (CESR). Nevertheless, compared to IFRS, Japanese local accounting standards (hereafter, J-GAAP) have a different implementation approach, which may affect the stock market consequences of voluntary IFRS adoption. Second, this study investigates earnings quality after voluntary IFRS adoption as a potential reason for changes in information asymmetry. Therefore, we complement and extend Daske et al.'s (2008) seminal work by investigating how voluntary IFRS adoption affects information asymmetry in a stock market where the local accounting standards are substantially converged with IFRS but apply an implementation approach that differs from that of IFRS—in other words, how switching from a rules-based to principles-based approach affects information asymmetry in a stock market.

IFRS adoption may potentially affect information asymmetry in stock markets via its impact on earnings quality (Benkraiem et al., 2022). Although this study focuses on voluntary adoption in Japan, where local accounting standards are converged with IFRS, differences may exist between IFRS and J-GAAP with respect to implementation approach (rules- vs. principles-based). To promote worldwide IFRS use (Barth et al., 2008; Carmona and Trombetta, 2008), the International Accounting Standards Board (IASB) adopted a principles-based approach, which provides more flexibility in accounting practices (i.e., recognition and measurement practices) and requires accountants' judgment in financial statement preparation (Carmona and Trombetta, 2008; Nelson, 2003). This contrasts with a rules-based approach, which provides more specific criteria, "bright-line" thresholds, examples, and implementation guidance (Carmona and Trombetta, 2008; Nelson, 2003). A principles-based approach is expected to decrease earnings management opportunities and improve earnings quality and thereby improve the quality of the information provided to investors (e.g., Barth et al., 2008; Schipper, 2003). However, prior research on mandatory IFRS adoption provides some evidence suggesting that earnings quality decreases after adoption (e.g., Ahmed et al., 2013; Capkun et al., 2016)[2] and that weak incentives to commit to transparent financial reporting impede earnings quality improvements in countries where the implementation approach differs from that of IFRS (Jeanjean and Stolowy, 2008). Thus, a difference in implementation approach can be an important factor in accounting practices under IFRS and, consequently, impact information environments in stock markets.

The IFRS literature often argues that a principles-based approach provides more flexibility in recognition and measurement practices. Suppose managers have strong incentives to commit to transparent financial reporting and exercise the flexibility inherent in a principles-based approach to reveal private information (reporting incentive explanation). In that case, IFRS adopters will enjoy the stock market benefits of voluntary IFRS adoption, including reduced information asymmetry in the stock market. However, the literature highlights that firms do not necessarily have incentives to commit to transparent financial reporting when adopting IFRS (e.g., Ball, 2016; Christensen et al., 2015). For example, Ball (2016) argues that parties who affect financial reporting practices derive incentives from local economic and political environments and that those incentives do not result in improved earnings quality under IFRS. Consequently, some studies show decreased earnings quality after (mandatory) IFRS adoption (e.g., Ahmed et al., 2013; Capkun et al., 2016). Thus, country- and firm-level reporting incentives are important factors that influence earnings quality under IFRS.

The reporting incentive explanation also predicts that managers opportunistically exercise the flexibility inherent in IFRS. Even without opportunistic intentions, firms may not have sufficient resources to make appropriate judgments regarding recognition and measurement (accounting resource explanation). Implementing IFRS requires that accountants possess solid knowledge of firm businesses and macro-economic conditions and comprehensively understand transactions and macro-economic events before

[1] Examples of Bae et al.'s (2008) measures include "Do not require a primary statement of changes in equity," "Require no or very limited capitalization of leases," and "Permit capitalization of research and development costs."

[2] Note that, as discussed later, some studies provide evidence suggesting that earnings quality increases after mandatory IFRS adoption.

determining accounting treatments (Carmona and Trombetta, 2008). To the extent that firm resources affect how firms understand their business transactions and how macro-economic conditions affect their businesses, limited resources negatively impact earnings quality under IFRS. Based on the reporting incentive and accounting resource explanations, decreased earnings quality is expected to deteriorate investors' information environments, thereby increasing information asymmetry in the stock market. Accordingly, since we can expect either positive or negative IFRS adoption effects, we do not predict a specific direction for IFRS adoption's average effect on information asymmetry in the stock market. Instead, we propose a null hypothesis that, on average, information asymmetry in the stock market and earnings quality do not change after voluntary IFRS adoption.

Firm size can be an important characteristic signifying firm reporting incentives and accounting resources when adopting IFRS in terms of how switching from a rules-based to principles-based approach affects information asymmetry in the stock market and earnings quality. Nobes and Perramon (2013) argue that small, listed firms face less pressure from markets (e.g., security analysts) and international investors and are not incentivized to make accounting choices to please them. They reveal that small listed continental European firms make more country-based traditional accounting choices than large firms do at the time of mandatory IFRS adoption. Moreover, firms with growth opportunities, including small- and medium-sized firms, are more likely to engage in opportunistic earnings management (e.g., Skinner, 1993). Thus, small- and medium-sized firms have weaker incentives to commit to more transparent financial reporting at the time of IFRS adoption, and reporting incentives vary according to firm size. Moreover, small- and medium-sized firms have fewer accounting resources than large firms. The Institute of Chartered Accountants for England & Wales (ICAEW, 2007) points out that "[t]he experience of smaller quoted companies was often very different from larger companies because, for example, of limited resources and a lack of prior experience of IFRS" (p. 26), and that "[s]mall companies appear to have been unable or unwilling to utilise internal resources and relied upon external advice and support to a greater extent" (p. 61). Consistent with this, De George et al. (2013) investigated Australian firms, finding that small firms experienced greater increases in audit fees and transition costs. Thus, small- and medium-sized firms' limited accounting resources can lead to lower earnings quality under IFRS. From the reporting incentive and accounting resource perspectives, firm size is an important but under-researched aspect that potentially affects accounting practices under IFRS. Our study investigates how firm size influences the effect of switching from a rules-based to principles-based approach (IFRS adoption) on information asymmetry in the stock market and earnings quality. Based on the reporting incentive and accounting resource explanations, we expect that earnings quality decreases and information asymmetry increases after small- and medium-sized firms voluntarily adopt IFRS.

Japan provides a relevant setting for investigating how IFRS adoption or switching from a rules-based to principles-based approach affect information asymmetry for three reasons. First, J-GAAP reflect a rules-based approach, but have substantially converged with IFRS. While there are four major differences in standards between J-GAAP and IFRS (e.g., periodic amortization vs. impairment-only approach for goodwill accounting), CESR evaluated J-GAAP as equivalent to IFRS in 2005. Nevertheless, in addition to the four accounting standard differences, there are 36 differences in implementation approach between J-GAAP and IFRS that affect recognition and measurement practices. Thus, our focus on Japan attenuates the effects of accounting rule differences and extracts the impact of implementation approach differences in IFRS adoption settings. Specifically, our research setting provides an opportunity to test whether and how increased accounting flexibility and complexity in recognition and measurement practices affect information asymmetry in the stock market.

Second, Japan permits voluntary IFRS adoption; in other words, we can compare firms using a principles-based approach to those applying a rules-based approach in the same institutional and regulatory environment. A limitation of prior IFRS adoption research is that confounding events, such as other institutional changes occurring around mandatory IFRS adoption, make it difficult to identify IFRS effects per se (Ball, 2016). We attempt to attenuate the effects of confounding events and identify the IFRS effect per se, especially the effect of implementation approach differences, by using a propensity score matching method to match voluntary IFRS adopters with non-adopters.

Third, firms of various sizes have voluntarily adopted IFRS in Japan—both large, globalized firms and small domestic firms. In Germany and Switzerland, which comprise a large proportion of voluntary IFRS adopters (Christensen, 2012), growth firms voluntarily adopted IFRS. However, stock market regulations in these countries required adoption (Leuz, 2003). The Japanese setting attenuates the market regulation effects that firms face in Germany and Switzerland. Moreover, studies in those countries do not investigate the differences in effects according to firm size.

Our sample begins with 116 firms that employ IFRS at the end of fiscal year 2018 (i.e., the fiscal year ending in March 2019). To control for potential differences in the firm characteristics of IFRS adopters and non-adopters, we conduct one-to-one propensity score matching with non-replacement to match IFRS adopters with non-adopters in fiscal year 2011. Therefore, our sample comprises panel data for 232 firms (116 adopters and 116 non-adopters) from 2010 to 2018. We further confine our sample to IFRS adopters and their counterparts with data available for three years before and after the treatment firms adopted IFRS—a total of six years. As a result, our final sample includes 70 adopters and 70 non-adopters for a total of 840 firm-year observations.

We then employ difference-in-differences estimation using propensity score matching to investigate how IFRS adoption affects information asymmetry and earnings quality. We use the bid-ask spread as our proxy for information asymmetry, following Leuz and Verrecchia (2000) and Cho et al. (2013), and cross-sectional discretionary accruals as our proxy for earnings quality, following Chen et al. (2010b) and Ahmed et al. (2013). We focus on how voluntary IFRS adoption affects information asymmetry and earnings quality, especially for small- and medium-sized listed firms. We classify sample firms as "small," "medium," or "large" based on their average

market capitalization for the three years before IFRS adoption. In our sample, "small" firms represent small- and medium-sized firms.

Our results can be summarized as follows. First, we find that, on average, the bid-ask spread increases after voluntary IFRS adoption. Second, the increase in bid-ask spread is mainly driven by "small" rather than "medium" and "large" firms. Third, we use four different discretionary accrual measures and find that "small" firms increase discretionary accruals after IFRS adoption. Overall, these results suggest that small- and medium-sized voluntary IFRS adopters experience increased information asymmetry in the Japanese stock market, which is at least partly caused by their decreased earnings quality. As firm size is an aggregate proxy for reporting incentives and accounting resources, we further investigate these potential reasons for decreased earnings quality. Our results reveal that these aspects of IFRS adopters negatively affect earnings quality following voluntary IFRS adoption. We also provide evidence suggesting that reporting incentives and accounting resources influence information asymmetry in the stock market after IFRS adoption.

This study contributes to the literature in at least two ways. First, our findings contribute to prior research on the effects of IFRS adoption, especially voluntary adoption. Previous studies have primarily focused on firms in Germany, where local accounting standards and IFRS are significantly different, and on international data, where the sample countries have various similarities and differences between local accounting standards and IFRS (including both accounting rule and implementation approach differences). This study extends the findings of previous studies, especially Daske et al. (2008), by looking more closely at a situation where local accounting standards are converged with IFRS but apply a different implementation approach, that is, small accounting rule differences but large implementation approach differences. Our findings suggest that, on average, Japanese firms experience increased information asymmetry and decreased earnings quality and that these IFRS adoption effects are driven by small- and medium-sized firms (i.e., our proxy for reporting incentives and accounting resources). This study also corroborates and extends prior research findings that document the negative effects of (mandatory) IFRS adoption on earnings quality (e.g., Ahmed et al., 2013; Capkun et al., 2016). It investigates what drives such effects and demonstrates that the difference in implementation approach (i.e., switching from a rules-based to principles-based approach) affects accounting quality (i.e., discretionary accruals) under IFRS. We also extend prior research by showing the consequences of IFRS adoption's negative effect on earnings quality, that is, an increase in information asymmetry, especially for small- and medium-sized adopters.

Second, this study contributes to prior research on small- and medium-sized firms' accounting choices under IFRS. Nobes and Perramon (2013) find that country-level pre-IFRS accounting practices persist after mandatory IFRS adoption, especially for small-sized firms. This study complements and extends their findings by investigating comprehensive accounting choices (i.e., discretionary accruals) but not the individual policy choices they examine (e.g., investment property at cost versus fair value). It shows that the increased flexibility in implementation under IFRS escalates the pre-adoption pattern of earnings quality, especially for small- and medium-sized firms. Japanese firms have historically engaged in earnings management to a greater extent than their counterparts in common law countries (Enomoto et al., 2015; Leuz et al., 2003). The rules-based approach, which restricts earnings management by providing specific criteria, "bright-line" thresholds, and related implementation guidance (Ahmed et al., 2013; Nelson, 2003), may have curtailed Japanese firms' opaque accounting practices under J-GAAP, especially for small- and medium-sized firms. In addition, under rules-based J-GAAP, small- and medium-sized firms prepare financial statements by following specific standards and guidance. This allows them to avoid unintended low-quality earnings stemming from limited accounting resources, as these resources are essential for making appropriate judgments under principles-based accounting standards. Our findings suggest that switching from a rules-based to principles-based approach negatively affects earnings quality and, hence, information asymmetry in the stock market for small- and medium-sized firms, which have both fewer incentives to commit to transparent financial reporting and limited accounting resources.

This study has implications for policymakers and investors. Our evidence of increased information asymmetry and decreased earnings quality highlights the consequences of opportunistic reporting incentives and limited accounting resources in Japan; this contrasts what is observed in Germany, whose local accounting standards substantially differ from IFRS. This finding's implications are also relevant to the IASB for evaluating their stated objective of improving earnings quality and increasing disclosure. In a voluntary adoption setting, management discretion or the increased flexibility inherent in a principles-based approach could degrade earnings quality and thus increase information asymmetry in stock markets. Finally, the study's results are of potential interest to standard-setters and securities regulators in countries permitting and considering voluntary IFRS adoption. The results are especially applicable to countries where local accounting standards are significantly convergent with IFRS and have a more rules-based approach than IFRS, such as the United States (Barth et al., 2012; Bradbury and Schröder, 2012; Hail et al., 2010a, 2010b; Ijiri, 2005). They are also relevant for developing countries where small- and medium-sized firms play important roles. For example, our results for "medium" and "large" firms highlight the importance of mechanisms to monitor IFRS implementation when IFRS adoption is voluntary. Moreover, Song and Trimble (2022) argue that IFRS for small- and medium-sized enterprises are potentially the most cost-effective in developing countries. Our result indicating the effect of limited accounting resources on accounting quality and information asymmetry in the stock market for small- and medium-sized firms supports such an argument.

The remainder of this paper is organized as follows. In Section 2, we review prior literature and propose hypotheses. Section 3 presents the research design, and Section 4 describes the results and robustness tests. We conduct additional analyses in Section 5. Section 6 concludes the paper.

2. Background and hypotheses development

2.1. Prior literature

2.1.1. The effect of IFRS adoption on information asymmetry in stock markets

Prior research offers mixed evidence on the stock market consequences of voluntary IFRS adoption. Early studies of voluntary IFRS adoption effects on information asymmetry in stock markets focus on Germany and show the positive effects of voluntary IFRS adoption on information asymmetry (Gassen and Sellhorn, 2006; Leuz and Verrecchia, 2000).[3] However, subsequent studies using global data have produced mixed results with respect to voluntary IFRS adoption's stock market consequences (Daske et al., 2008; Daske et al., 2013). Daske et al. (2008) use two proxies for differences between local accounting standards and IFRS and report inconsistent liquidity effect results. Specifically, they observe no change in liquidity after voluntary IFRS adoption in countries with small GAAP/IFRS differences but a decrease in liquidity in countries with IFRS convergence processes. Additionally, Daske et al. (2013) demonstrate that positive stock market consequences are observed only for IFRS adopters with strong incentives to commit to transparent financial reporting ("serious" adopters as opposed to "label" adopters). Therefore, current evidence of voluntary IFRS adoption's stock market consequences is inconsistent.

In mandatory IFRS adoption settings, prior research provides mixed evidence regarding IFRS's effects on information asymmetry in stock markets (Abad et al., 2018; Benkraiem et al., 2022; Christensen et al., 2013; Daske et al., 2008; Li, 2010; Platikanova and Perramon, 2012; Neel, 2017). Although the average effect of mandatory IFRS adoption is unclear, regulatory changes and differences between IFRS and local accounting standards are important determinants. For example, Christensen et al. (2013) conclude that changes in enforcement, rather than mandatory IFRS adoption, affect changes in information asymmetry in the stock markets around mandatory IFRS adoption. More importantly, the benefits of mandatory adoption are smaller or non-existent in countries whose local accounting standards are close to or converged with IFRS. This suggests that the extent to which IFRS and local accounting standards differ is an important factor in determining the effect of mandatory IFRS adoption (Abad et al., 2018; Benkraiem et al., 2022; Daske et al., 2008; Platikanova and Perramon, 2012). In their analysis of mandatory IFRS adoption, Daske et al. (2008) show that improvement in liquidity factor scores, which consider bid-ask spread (information asymmetry), is larger or exists only for firms in countries whose local accounting standards are neither close to nor converged with IFRS.

Overall, prior research using samples from Germany, whose local accounting standards are substantially different from IFRS, provides evidence of a positive effect of voluntary IFRS adoption on information asymmetry in the stock market; the findings from mandatory IFRS adoption studies highlight the importance of differences between IFRS and local accounting standards. However, the results of international comparison research are inconsistent regarding voluntary adoption liquidity effects in countries whose local accounting standards are similar or converged to IFRS. Therefore, how voluntary IFRS adoption affects information asymmetry in countries whose local accounting standards are close to or converged with IFRS is unclear. This study looks more closely at a country whose local accounting standards are converged with IFRS but have a different implementation approach (i.e., small accounting rule differences but large implementation approach differences). It extends the literature on voluntary IFRS adoption by investigating its stock market effects (i.e., changes in information asymmetry in the stock market proxied by bid-ask spread) and its potential reason (i.e., changes in earnings quality proxied by the absolute value of discretionary accruals).

2.1.2. The effect of IFRS adoption on earnings quality

Extant literature suggests that earnings quality affects information asymmetry measured as the bid-ask spread (Bhattacharya et al., 2012; Bhattacharya et al., 2013). In the context of IFRS adoption, Cho et al. (2015) and Benkraiem et al. (2022) argue that the change in information asymmetry after IFRS adoption is due to earnings quality changes. Thus, IFRS adoption can affect information asymmetry through changes in earnings quality.[4] Adopting IFRS, which is principles-based, is expected to improve earnings quality by requiring recognition and measurement choices that conform to business substance, hence limiting potential managerial accounting choices (Barth et al., 2008). However, substance-oriented accounting choices involve management judgment, which may result in accounting choices that are based not on business substance but on management incentives (Capkun et al., 2016). Therefore, an important concern regarding IFRS adoption is how a principles-based approach affects accounting practices and adoption consequences and is vigorously debated.

[3] Prior research also investigates information asymmetry-related stock market consequences of IFRS or IAS. Daske (2006) finds that the cost of capital is higher for German firms that voluntarily adopt internationally recognized accounting standards such as IFRS or U.S. GAAP than for their local counterparts. Cross-country studies on voluntary adoption provide mixed evidence regarding the cost of capital (Cuijpers and Buijink, 2005; Kim et al., 2014) and analysts' forecast errors (Ashbaugh and Pincus, 2001; Cuijpers and Buijink, 2005; Kim and Shi, 2012).

[4] High-quality disclosure reduces information asymmetries (Tran, 2022; Wang et al., 2022). Thus, the quality of disclosure is another potential path through which IFRS adoption affects information asymmetry in stock markets (Hodgdon et al., 2008). For example, in the EU's mandatory IFRS adoption setting, disclosure compliance related to business combinations and asset impairment is determined by firm-level factors, such as auditor type and ownership structure, and country-level factors, such as enforcement and the size of national stock markets (Glaum et al., 2013). Studies that focus on individual countries like Greece, Kenya, and Bahrain, where enforcement is relatively low, show that disclosure compliance levels are affected by listing status (Ballas and Tzovas, 2010), auditor type, and industry (Tsalavoutas, 2011) in Greece; foreign ownership and share turnover in Kenya (Bova and Pereira, 2012); and corporate governance in Bahrain (Juhmani, 2017). Note that IFRS adoption may increase or decrease the number of analysts following IFRS adopters; because the number of analysts can be viewed as a proxy for information asymmetry, we do not discuss this dimension.

Earnings quality under IFRS (or IAS) is investigated in both voluntary and mandatory adoption settings. Early studies investigate voluntary adoption settings—especially in Germany—and provide mixed results. That is, van Tendeloo and Vanstraelen (2005) find some evidence that earnings quality decreases after voluntary IFRS adoption, while Christensen et al. (2015) provide evidence suggesting that voluntary adopters' earnings quality improves and that mandatory adopters' earnings quality does not change. However, the benchmark samples of van Tendeloo and Vanstraelen (2005) and Christensen et al. (2015) are an important difference. Specifically, van Tendeloo and Vanstraelen (2005) investigate the differences in earnings management between adopters and non-adopters, while Christensen et al. (2015) separately investigate and compare earnings quality improvements between pre- and post-adoption periods for voluntary and mandatory adopters. This sample selection difference may be the reason for the diverse results. Barth et al. (2008) investigate firms from 21 countries and suggest earning quality improves after IAS adoption. However, they caution that their findings are attributable not only to financial reporting system changes but also to changes in firms' incentives and regulatory environments. Thus, earnings quality research in voluntary adoption settings likely suffers from failure to control for changes in country-level regulations and firm-level reporting incentives.

In mandatory adoption settings, prior research also provides mixed evidence suggesting improvements (Chen et al., 2010b; Chua et al., 2012; Zeghal et al., 2012), deterioration (Ahmed et al., 2013; Jeanjean and Stolowy, 2008), or no changes in earnings quality (Doukakis, 2014; Liu and Sun, 2015).[5] Among these, Ahmed et al. (2013) and Doukakis (2014) employ a difference-in-differences approach to address endogeneity issues. Considering accounting convergence, Zeghal et al. (2012) suggest that earnings quality improvements are not observed for firms in countries where accounting standards are converged to a greater extent. Overall, prior research provides mixed results regarding the average effects of IFRS adoption on earnings quality.

Although prior research actively argues that principles-based IFRS permits greater management discretion and hence affects earnings quality, it does not distinguish the accounting rule and implementation approach differences between local accounting standards and IFRS. This may be because there are many differences in both accounting rules and implementation approaches between local GAAP and IFRS across voluntary and mandatory adoption countries. This study tackles this issue by focusing on a single country, which allows us to compare changes in information asymmetry and earnings quality for IFRS adopters with those for non-adopters in the same institutional setting. Furthermore, it utilizes the Japanese context, where the accounting rules have substantially converged with IFRS, but the implementation approach differs from that of IFRS (i.e., rules- vs. principles-based).

2.2. Japanese setting

In this section, we explain how Japanese firms' earnings quality differs from that in common law countries, where IFRS originated. We then explain how the implementation approach differences between J-GAAP and IFRS allow for greater management discretion and discuss our hypotheses.

2.2.1. Earnings quality in Japan

Prior research suggests that Japanese firms' earnings quality differs from what shareholders prefer. Ball et al. (2000) show that the degree of conditional conservatism is lower in Japan than in common law countries, such as Canada and the U.S., where accounting numbers are produced mainly for shareholders. Leuz et al. (2003) report that use of accounting discretion and the degree of income smoothing are high in Japan, which ranks 10th among 31 countries in terms of an aggregate earnings management score. The practices Leuz et al. (2003) report are also observed in Enomoto et al.'s (2015) study. Moreover, they are consistent with Ali and Hwang's (2000) finding that value relevance is lower for continental than British–American accounting model countries. Shareholders may view reported earnings that are less conditionally conservative and subject to earnings management as opaque; such earnings may result in greater information asymmetry in the stock market (Ball et al., 2000; Leuz et al., 2003). Thus, Japanese firms' traditional earnings quality differs from that of firms in common law countries, where IFRS originate.

The underlying explanation for more opaque accounting practices in Japan than in countries with shareholder governance is that stakeholder governance, where insiders can access private information, results in more opaque accounting than shareholder governance (Ball et al., 2000). With shareholder governance, outsiders without access to private information require comparatively more transparent accounting (Leuz et al., 2003). At the time of those studies, Japan was a bank-centered economy viewed as having stakeholder governance and an insider economy. However, since the late 1990s, its corporate governance has moved from a stakeholder perspective toward a shareholder one or from an insider economy toward an outsider one (Franks et al., 2014; Miyajima et al., 2015; Miyajima and Ogawa, 2016). For example, foreign ownership increased from 5.4 % in 1991 to 26.5 % in 2016. Note that Japan's current governance differs from the shareholder governance found in Anglo-Saxon countries. Therefore, Japan's current accounting practices could be a mix of opaque and transparent. However, as Enomoto et al. (2015) show, accounting practices in Japan are still expected to be more opaque than those in countries with shareholder governance.

[5] These studies investigate not only accrual quality or earnings management but also timely loss recognition and the value relevance of earnings. In this study, we discuss only the accrual quality (earnings management) dimension.

2.2.2. J-GAAP and IFRS

While J-GAAP have a rules-based approach, the influence of IFRS or IAS on J-GAAP has increased since the early 2000s, triggered by mandatory IFRS adoption in the European Union in 2005. As the European Commission required companies outside the EU to prepare consolidated financial statements under IFRS or equivalent accounting standards, use of J-GAAP would not have been accepted in EU markets if J-GAAP had not been considered equivalent to IFRS until 2007 (FSA, 2005).

In 2005, CESR pointed out 26 differences between J-GAAP and IFRS (CESR, 2005). In the August 2007 so-called "Tokyo agreement," the Accounting Standards Board of Japan (ASBJ) and IASB agreed to accelerate the convergence process after 2008 (ASBJ, 2007). In December 2007, CESR accepted J-GAAP as equivalent to IFRS unless there was evidence that the target in the Tokyo agreement was not achieved. After the agreement, convergence of J-GAAP with IFRS was advanced to resolve the differences CESR pointed out between them, and many, but not all, major differences have now been resolved. ASBJ considers that four important differences remain: non-amortization of goodwill, issues related to recycling items of other comprehensive income and profit or loss, the scope of fair value measurement, and capitalization of development costs (ASBJ, 2015). Thus, because most of J-GAAP have converged with IFRS on an accounting rule level, leaving only small accounting rule differences between them, mere adoption of IFRS may not indicate a strong commitment to transparent financial reporting.

However, implementation approaches remain another important difference between J-GAAP and IFRS: J-GAAP have a rules-based approach, while IFRS have a principles-based approach (Hiramatsu, 2020). Appendix A compares the implementation approaches of J-GAAP and IFRS and shows 13 differences in those approaches. Moreover, 36 accounting procedure differences may potentially cause accrual differences (see Appendix B). Generally, the implementation process of the principles-based approach provides more accounting choice flexibility than rules-based approaches (e.g., Capkun et al., 2016). Thus, although J-GAAP are similar to IFRS in terms of the extent of accounting standard existence or non-existence (i.e., small accounting rule differences), the difference in their implementation approaches is still large (i.e., large implementation approach differences). Consequently, voluntary IFRS adoption in Japan may result in earnings quality changes due to the enhanced accounting flexibility in its implementation process.

In sum, J-GAAP are equivalent to IFRS on an accounting rule level (i.e., small accounting rule differences), but IFRS allows for more accounting flexibility (i.e., large implementation approach differences). Hence, IFRS adopters' attitudes toward committing to transparent financial reporting will influence the effects of voluntary IFRS adoption. On the one hand, voluntary adopters may adopt IFRS and exercise enhanced flexibility in accounting choices to commit to transparent financial reporting. The literature also argues that a principles-based approach increases the information usefulness of financial statements. Dye and Verrecchia (1995) suggest that reporting flexibility results in more informative signals about firms' performance. Carmona and Trombetta (2008) state that the rules-based approach imposes uniform accounting treatments on firms operating in different business environments, which results in informational costs because it reduces the amount of information that observers can extract from firms' accounting policy choices. The literature also argues that earnings reported under IFRS may be more informative if managers use its increased reporting flexibility to convey private information (Atwood et al., 2011; Gordon et al., 2017; Leuz, 2010).

On the other hand, as J-GAAP are evaluated as equivalent to IFRS (at least on an accounting rule level), voluntary IFRS adoption in Japan may not necessarily be regarded as a strong commitment to transparent financial reporting. Instead, voluntary IFRS adopters in Japan can enjoy enhanced accounting flexibility for opportunistic purposes (reporting incentive explanation), as suggested by prior mandatory IFRS adoption research (e.g., Ahmed et al., 2013; Capkun et al., 2016). A firm's accounting resources can also affect earnings quality after IFRS adoption (accounting resource explanation). Smaller firms are more likely to have weaker internal control systems and make ex-post reported earnings corrections (e.g., Ge and McVay, 2005; Doyle et al., 2007; Kinney and McDaniel, 1989). In Japan, voluntary IFRS adopters range from small to large firms. Thus, it is possible that, on average, earnings quality decreases after voluntary IFRS adoption. In addition, to the extent that IFRS allow for more flexibility (e.g., impairment-only approach for goodwill and capitalization of development costs), accounting verifiability decreases, which increases auditing difficulty and decreases adopters' earnings quality (accounting verifiability explanation), regardless of earnings management incentives.

Moreover, some firms may adopt IFRS for purposes other than transparent financial reporting or opportunistic purposes. For example, some firms prepare financial reports in a manner consistent with foreign subsidiaries (FSA, 2015).[6] In this case, IFRS adoption may not affect information asymmetry in the stock market to the extent that J-GAAP are equivalent to IFRS on an accounting rule level. Therefore, it is difficult to predict how voluntary IFRS adoption affects information asymmetry in the Japanese stock market. We propose a null first hypothesis regarding the effect of voluntary IFRS adoption in Japan.

$H1_0$. On average, information asymmetry in the stock market does not change after voluntary IFRS adoption.

We argue that firm size represents the reporting incentive and accounting resource explanations. Generally, small- and medium-sized firms do not have incentives to meet the demands of outside shareholders, who have preference to transparent financial reporting (Nobes and Perramon, 2013). Furthermore, the probability that annual reports refer to qualitative characteristics, such as

[6] We used the EOL database provided by I-N INFORMATION SYSTEMS, LTD. to check the "Adoption of International Financial Reporting Standards" reports that Japanese IFRS adopters are required to disclose, and collected data on the reasons they voluntarily adopted IFRS. 43.8 % of IFRS adopters stated it was to unify accounting treatments within their company group.

relevance, faithful representation, comparability, understandability, and transparency, is lower for small firms when firms change their accounting policies after mandatory IFRS adoption (Nobes and Stadler, 2015).[7] Moreover, at the time of IFRS adoption, small- and medium-sized firms are more likely than large counterparts to follow country-based accounting practices, which may not conform to IFRS principles (Nobes and Perramon, 2013).[8] As discussed in Section 2.2.1, accounting practices in Japan are opaque and Japanese firms have strong incentives to engage in earnings management. A principles-based approach may permit financial reporting consistent with management incentives, whereas a rules-based approach prevents such financial reporting by providing more specific criteria, "bright-line" thresholds, examples, and implementation guidance (Ahmed et al., 2013; Nelson, 2003). Thus, it is likely that small- and medium-sized adopters will exploit the accounting flexibility inherent in IFRS, In contrast, large firms are more likely to face market scrutiny by, for example, security analysts (Bhushan, 1989; Lang and Lundholm, 1996; Yu, 2008); to be owned by foreign investors, who are institutional investors and play a monitoring role (Guo et al., 2015; Kang and Stulz, 1997; Lel, 2019); and to be audited by Big 4 auditors (Lawrence et al., 2011; Nobes and Perramon, 2013). Thus, compared to large firms, small- and medium-sized firms can more easily exploit the increased accounting flexibility under IFRS (the reporting incentive explanation). Moreover, firms with growth opportunities, including small- and medium-sized firms, are more likely to engage in opportunistic earnings management (Doyle et al., 2007; Chen et al., 2010a; Skinner, 1993).

In addition to earnings management incentives (the reporting incentive explanation), small- and medium-sized firms may have difficulties in implementing IFRS. To be specific, despite IFRS requirements for solid knowledge about firms' businesses, small- and medium-sized firms have limited resources to assist in making accounting choices that conform to the principles-based approach (Cassar and Ittner, 2009; De George et al., 2013; ICAEW, 2007). Moreover, small- and medium-sized firms are more likely to report internal control deficiencies and restate previously reported earnings.[9] Even if these firms do not intend to engage in earnings management, limited resources can result in lower earnings quality, which leads to increased information asymmetry (the accounting resource explanation). Therefore, we expect decreased earnings quality and increased information asymmetry for small- and medium-sized firms after voluntary IFRS adoption. This discussion leads to our final two hypotheses.

H2. *For small- and medium-sized firms, information asymmetry in the stock market increases after voluntary IFRS adoption.*

H3. *For small- and medium-sized firms, earnings quality decreases after voluntary IFRS adoption.*

3. Research design

3.1. Sample selection

3.1.1. First-stage selection

Our research design uses a two-stage sample selection procedure. The sample selection process for our first-stage sample (Table 1) starts with 32,432 observations between 2010 and 2018 (i.e., observations with fiscal year-ends between April 2010 and March 2019[10]).[11] We then delete observations with fiscal years of less than 12 months (1021 observations); those in the financial industry (1482 observations); firms that switched from U.S. GAAP to IFRS (260 observations); firms that adopted IFRS before or at the time of their initial public offering (85 observations); those that announced IFRS adoption but have not adopted (86 observations); firms that adopted IFRS prior to and in 2011 (44 observations),[12] those that adopted IFRS after 2018 (68 observations); firms that lacked

[7] Firm disclosure practices are also likely to affect information asymmetry in the stock market. However, neither the studies investigating single countries nor those comparing firms around the world find any statistically significant relationship between firm size and disclosure compliance level (Bova and Pereira, 2012; Ballas and Tzovas, 2010; Glaum et al., 2013; Juhmani, 2017; Tsalavoutas, 2011). Thus, firm size appears unrelated to disclosure compliance.

[8] Nobes and Perramon (2013) investigate only policy choices that are observable in annual reports (e.g., investment property at cost versus fair value) and show that, even after IFRS adoption, small firms continue to employ accounting policies that conform to traditional accounting practices. Our scope of accounting practices is broader than theirs; that is, our study includes accounting choices that involve accounting recognition and measurement and hence a greater degree of management judgement (e.g., decisions not to recognize goodwill impairment losses). Thus, country-level accounting practices (e.g., opaque versus transparent) are important in our setting.

[9] We hand-collect data on restatements of financial statements after voluntary IFRS adoption. Untabulated results indicate that the proportions of restatement firms are 17.39 %, 12.50 %, and 0 % for "small," "medium," and "large" IFRS adopters, respectively. See Section 3.3 "Data and summary statistics" for the definitions of "small," "medium," and "large" adopters.

[10] In this study, we define "fiscal year t" as the fiscal year-end between April (year t) and March (year $t + 1$). For example, "fiscal year 2010″ includes firms with fiscal year-ends from April 2010 to March 2011. This reflects the fact that fiscal year ending months for Japanese firms range from January to December. March is the most popular ending month (68.5 % in 2010, 62.4 % in 2018), and the second most popular ending month is December, with 8.6 % in 2010 and 11.8 % in 2018.

[11] IFRS could be voluntarily adopted for listed companies' consolidated financial statements beginning with the fiscal year ending on March 31, 2010 (BAC, 2009). The application requirements were relaxed in 2013 to encourage voluntary IFRS adoption (BAC, 2013).

[12] As noted in Section 3.1.2, we delete observations where IFRS were adopted prior to and in 2011 because we use 2011 as the matching period for our propensity score matching for the second-stage analysis. Including these observations could introduce noise, and our matching process would not be proper because their accounting standards would differ from other observations. To address this concern, we delete these observations (5 firms × 9 years = 45; among the 45 observations, one is excluded from our sample before the current procedure because its fiscal year is less than 12 months).

Table 1
Selection Process for First-stage Sample.

		Obs.	%
Observations with Fiscal Year between 2010 and 2018		32,432	100 %
deducted	Number of closing months is not twelve	1021	3.15 %
	Industry is financial industry	1482	4.57 %
	Firms switching from US-GAAP to IFRS	260	0.80 %
	Firms adopting IFRS with IPO	85	0.26 %
	Firms that announced but have not yet adopted IFRS	86	0.27 %
	Firms adopting IFRS prior to and in 2011	44	0.21 %
	Firms adopting IFRS after 2018	68	0.21 %
	Firms without sufficient data	1450	4.47 %
	Firms that are not listed on consecutively for 9 years	3465	10.68 %
The final number of observations for our first-stage sample		24,471	75.45 %

Note: This table reports our sample selection process for the first-stage sample. Our first-stage sample starts with 32,432 observations with fiscal years between 2010 and 2018 (between April 2010 and March 2019) obtained from Nikkei NEEDS Financial QUEST2.0. We delete observations for the number of closing months other than twelve months; in the financial industry; switching their financial reporting standards from US-GAAP to IFRS; adopting IFRS for their financial reporting standards with IPO; that announced adopting IFRS for their financial reporting standards but have not yet adopted; that adopted IFRS prior to and in 2011; that adopted IFRS after 2018; for which we cannot obtain sufficient data; and that are not listed on the stock markets consecutively between 2010 and 2018. As a result of this sample selection process, our first-stage sample consists of 24,471 observations, which is 75.45 % of our initial sample. To cope with the effect of potential outliers on our regression results, we winsorize variables above the top 99.5 percentile and below the 0.5 percentile by year.

Table 2
Distribution of First-stage Sample.

Year	Overall	IFRS	J-GAAP
2010	2719	0	2719
2011	2719	0	2719
2012	2719	2	2717
2013	2719	12	2707
2014	2719	34	2685
2015	2719	47	2672
2016	2719	72	2647
2017	2719	93	2626
2018	2719	116	2603
Total	24,471	376	24,095

Note: This table reports the distribution of our first-stage sample. Our sample period is from 2010 to 2018, and our first-stage sample consists of observations of firms that are listed on the stock markets consecutively during those years. As a result, each year has 2719 observations. In 2018, 116 out of 2719 firms prepared and reported their consolidated financial statements in accordance with IFRS instead of J-GAAP, resulting in 376 observations for our first-stage sample. In contrast, 2603 out of 2719 firms prepared and reported their financial statements in accordance with J-GAAP, resulting in 24,095 observations for our first-stage sample.

sufficient data for our analyses (1450 observations); and those that were not listed on a stock market consecutively between 2010 and 2018 (3465 observations). As a result of this process, our first-stage sample consists of 24,471 observations, or 75.45 % of our initial sample.

Table 2 presents the distribution of our first-stage sample. Our first-stage sample consists of firm-year observations of firms consecutively listed on the stock markets during 2010–2018; each year has 2719 observations. In 2018, 116 out of 2719 firms prepared and reported their consolidated financial statements in accordance with IFRS instead of J-GAAP (i.e., IFRS adopters). These firms have 376 firm-year observations in our first-stage sample period. In contrast, 2603 out of 2719 firms prepared and reported their financial statements in accordance with J-GAAP (hence, J-GAAP firms). These firms represent 24,095 firm-year observations for our first-stage sample period.

3.1.2. Second-stage selection—propensity score matching

Prior research shows some systematic differences between IFRS adopters and J-GAAP firms (Inoue and Ishikawa, 2014). Therefore, we use propensity score matching to construct a matched sample for the second stage. The propensity score refers to the probability of

being assigned to the treatment group (voluntary IFRS adopting firms in this study) after considering observable differences in the characteristics (covariates) between the treatment and control groups. In this study, the control group comprises firms that do not adopt IFRS, that is, J-GAAP firms.

We use propensity score matching to remedy endogeneity problems resulting from observable covariates between the treatment and control groups (Gassen and Sellhorn, 2006; Rosenbaum and Rubin, 1983). Thus, to the extent that we can correctly identify covariates that create endogeneity issues, propensity score matching can effectively cope with problems arising from potential self-selection bias. We first calculate propensity scores and then select control group firms that did not adopt IFRS but whose characteristics are similar to those of the IFRS adopters. Specifically, for IFRS adopters in our first-stage sample, we use non-replacement and match only one J-GAAP adopter (i.e., one-to-one matching) for the control group (Shipman et al., 2017). Eq. (1) is the probit regression model used to explain the characteristics of voluntary IFRS adopters in Japan. This model is based on Gassen and Sellhorn (2006) and Inoue and Ishikawa (2014).[13] [14] To cope with the effect of potential outliers on our regression results, we winsorized the continuous variables in the top and bottom 0.5 percentiles by year. Eq. (1) is as follows:

$$\text{Prob}(IFRS_i = 1) = \alpha_0 + \alpha_1 Log(Size\_Mcap)_{i,2011} + \alpha_2 Goodwill_{i,2011} + \alpha_3 R\&D_{i,2011} + \alpha_4 SalesF_{i,2011} + \alpha_5 ShareF_{i,2011} + \alpha_6 Debt_{i,2011} + \alpha_7 EBIT_{i,2011} + \alpha_8 FreeFloat_{i,2011} + IndustryFixedEffect_i + \varepsilon_{i,2011} \quad (1)$$

$IFRS_i$=dummy variable for observations of firms that adopted IFRS in our first-stage sample period;
$Log(Size\_Mcap)_{i,2011}$=natural logarithm of market capitalization at the end of fiscal year 2011;

Table 3
Estimation Results for the First-stage IFRS Selection Probit Model.

Variables	coefficient	*z*-statistic
constant	-12.5122	-10.96***
$Log(Size\_Mcap)_{i,2011}$	0.4170	8.51***
$Goodwill_{i,2011}$	9.1658	6.38***
$R\&D_{i,2011}$	2.2354	1.18
$SalesF_{i,2011}$	0.6699	2.27**
$ShareF_{i,2011}$	-0.1207	-0.21
$Debt_{i,2011}$	0.4057	1.18
$EBIT_{i,2011}$	0.1786	0.22
$FreeFloat_{i,2011}$	-1.1646	-3.01***
$IndustryFixedEffect_i$	Included	
Pseudo R^2	0.3950	
N	2719	

Note: This table reports the results of estimating the following OLS regression. *z*-statistics are calculated using White's (1980) heteroscedasticity-consistent standard error.
$\text{Prob}(IFRS_i = 1) = \alpha_0 + \alpha_1 Log(Size\_Mcap)_{i,2011} + \alpha_2 Goodwill_{i,2011} + \alpha_3 R\&D_{i,2011} + \alpha_4 SalesF_{i,2011} + \alpha_5 ShareF_{i,2011} + \alpha_6 Debt_{i,2011} + \alpha_7 EBIT_{i,2011} + \alpha_8 FreeFloat_{i,2011} + IndustryFixedEffect_i + \varepsilon_{i,2011}$
$IFRS_i$ = dummy variable for observations of firms that adopted IFRS in our first-stage sample period; $Log(Size\_Mcap)_{i,2011}$ = natural logarithm of market capitalization at the end of 2011; $Goodwill_{i,2011}$ = ratio of goodwill to total assets at the end of fiscal year 2011; $R\&D_{i,2011}$ = ratio of R&D expenses to total sales in 2011; $SalesF_{i,2011}$ = ratio of foreign sales to total sales in 2011; $ShareF_{i,2011}$ = ratio of foreign shareholdings to total shareholdings at the end of fiscal year 2011; $Debt_{i,2011}$ = ratio of total liabilities to total assets at the end of fiscal year 2011; $EBIT_{i,2011}$ = ratio of EBIT to total sales in 2011; $FreeFloat_{i,2011}$ = ratio of free float at the end of fiscal year 2011; $IndustryFixedEffect_i$ = industry dummy variables (Nikkei medium classification). Subscripts *i* and 2011 represent firm and year 2011, respectively. *** and ** indicate two-tailed significance at the 0.01 and 0.05 levels, respectively.

[13] Eq. (1) is primarily based on Inoue and Ishikawa (2014), who are frequently cited in the IFRS-related literature written in Japanese. However, we modify two variables: operating income and total assets. First, we use earnings before interest and taxes (*EBIT*) instead of operating income because some IFRS adopters in Japan do not disclose operating income. Second, following Gassen and Sellhorn (2006), we use market capitalization instead of total assets as our proxy for firm size in the second-stage regression model. Because it is more appropriate to use the same proxy variable for size in both the first- and second-stage regressions (Leuz and Verrecchia, 2000), we also use market capitalization in the first stage. Similarly, instead of *CLOSEHELD,* used by Gassen and Sellhorn (2006), we add *FreeFloat* to Inoue and Ishikawa's (2014) regression model because based on Leuz and Verrecchia (2000), our second-stage regression model includes *FreeFloat.*

[14] One of the major differences between J-GAAP and IFRS is accounting for goodwill: J-GAAP require periodic amortization; IFRS employ an impairment-only approach. Japanese firms may voluntarily adopt IFRS to avoid amortizing current and/or future large book goodwill. Our matching variable $Goodwill_{i,2011}$ might not capture future large book goodwill, that is, future M&A aggressiveness with large goodwill. However, a propensity score matching model should include only past or current variables, but not variables at a future point. Thus, we assume that the current M&A aggressiveness with large goodwill continues after voluntary IFRS adoption.

Table 4
Summary Statistics for First-stage Variables Before Propensity Score Matching.

Panel A: $IFRS_i$ =1

	mean	stdev	min	25 %ile	median	75 %ile	max	*n*
$Log(Size\_Mcap)_{i,2011}$	25.812	1.788	21.490	24.470	26.257	27.256	28.434	116
$Goodwill_{i,2011}$	0.042	0.061	0.000	0.000	0.010	0.063	0.215	116
$R\&D_{i,2011}$	0.042	0.055	0.000	0.001	0.024	0.054	0.257	116
$SalesF_{i,2011}$	0.323	0.276	0.000	0.000	0.361	0.523	0.862	116
$ShareF_{i,2011}$	0.217	0.136	0.000	0.105	0.220	0.291	0.585	116
$Debt_{i,2011}$	0.471	0.190	0.071	0.337	0.485	0.621	0.876	116
$EBIT_{i,2011}$	0.088	0.099	-0.431	0.036	0.061	0.114	0.384	116
$FreeFloat_{i,2011}$	0.494	0.181	0.103	0.335	0.511	0.662	0.823	116

Panel B: $IFRS_i$ =0

	mean	stdev	min	25 %ile	median	75 %ile	max	*n*
$Log(Size\_Mcap)_{i,2011}$	23.174	1.630	19.878	21.967	22.972	24.208	28.434	2603
$Goodwill_{i,2011}$	0.007	0.023	0.000	0.000	0.000	0.001	0.215	2603
$R\&D_{i,2011}$	0.015	0.031	0.000	0.000	0.003	0.017	0.257	2603
$SalesF_{i,2011}$	0.113	0.201	0.000	0.000	0.000	0.165	0.862	2603
$ShareF_{i,2011}$	0.077	0.106	0.000	0.003	0.028	0.113	0.585	2603
$Debt_{i,2011}$	0.486	0.206	0.062	0.324	0.484	0.646	0.948	2603
$EBIT_{i,2011}$	0.048	0.078	-0.431	0.018	0.041	0.076	0.384	2603
$FreeFloat_{i,2011}$	0.469	0.162	0.079	0.346	0.476	0.596	0.823	2603

Panel C: Test of Differences

	Mean		Median	
	Difference	*t*-statistic	Difference	*z*-statistic
$Log(Size\_Mcap)_{i,2011}$	2.638	16.98***	3.285	12.90***
$Goodwill_{i,2011}$	0.035	14.14***	0.010	11.96***
$R\&D_{i,2011}$	0.027	8.66***	0.021	6.94***
$SalesF_{i,2011}$	0.210	10.82***	0.361	9.99***
$ShareF_{i,2011}$	0.140	13.69***	0.192	11.15***
$Debt_{i,2011}$	-0.014	-0.74	0.001	-0.63
$EBIT_{i,2011}$	0.039	5.27***	0.020	5.33***
$FreeFloat_{i,2011}$	0.025	1.61	0.035	1.68*

Note: This table reports summary statistics for the first-stage variables before propensity score matching. The variable definitions are as follows. $IFRS_i$ = dummy variable for observations of firms that adopted IFRS in our first-stage sample period; $Log(Size\_Mcap)_{i,2011}$ = natural logarithm of market capitalization at the end of 2011; $Goodwill_{i,2011}$ = ratio of goodwill to total assets at the end of fiscal year 2011; $R\&D_{i,2011}$ = ratio of R&D expenses to total sales in 2011; $SalesF_{i,2011}$ = ratio of foreign sales to total sales in 2011; $ShareF_{i,2011}$ = ratio of foreign shareholdings to total shareholdings at the end of fiscal year 2011; $Debt_{i,2011}$ = ratio of total liabilities to total assets at the end of fiscal year 2011; $EBIT_{i,2011}$ = ratio of EBIT to total sales in 2011; $FreeFloat_{i,2011}$ = ratio of free float at the end of fiscal year 2011. Subscripts *i* and 2011 represent firm and year 2011, respectively. *** and * indicate two-tailed significance at the 0.01 and 0.10 levels, respectively.

$Goodwill_{i,2011}$=ratio of goodwill to total assets at the end of fiscal year 2011;
$R\&D_{i,2011}$=ratio of R&D expenses to total sales in 2011;
$SalesF_{i,2011}$=ratio of foreign sales to total sales in 2011;
$ShareF_{i,2011}$=ratio of foreign shareholdings to outstanding shares (excluding treasury shares) at the end of fiscal year 2011;
$Debt_{i,2011}$=ratio of total liabilities to total assets at the end of fiscal year 2011;
$EBIT_{i,2011}$=ratio of EBIT to total sales in 2011;
$FreeFloat_{i,2011}$=ratio of free float at the end of fiscal year 2011, defined as the value of one minus the shareholding rate of top 10 shareholders to outstanding shares (excluding treasury shares);
$IndustryFixedEffect_i$=industry dummy variables (Nikkei medium classification industry codes).

In 2011, all 116 IFRS adopters in our first-stage sample used J-GAAP instead of IFRS, so we can match their counterparts based on J-GAAP, not IFRS, thus controlling for the effect of accounting standard differences on the matching procedure. As a result of the propensity score matching, we select 116 J-GAAP firms that did not adopt IFRS at any time during our sample period, but whose characteristics in 2011 were similar to those of the 116 IFRS adopters.

Table 3 presents the estimation results of Eq. (1); the probit estimation has a pseudo R-squared value of 39.50 %. In addition, Tables 4 and 5 present the summary statistics of the variables included in our matching procedure before and after conducting propensity score matching, respectively. The differences in the covariates between IFRS adopters and non-adopters before propensity score matching (Panel C of Table 4) nearly disappear after matching (Panel C of Table 5). Although we still observe a statistically significant difference for the median of $Goodwill_{i,2011}$, the result indicates that its difference is only marginal, suggesting that the matching procedure is generally appropriate. The sample selection process results in 116 IFRS adopters and 116 non-adopters that use J-GAAP throughout our sample period.

Table 5
Summary Statistics for First-stage Variables After Propensity Score Matching.

Panel A: $IFRS_i$ =1

	mean	stdev	min	25 %ile	median	75 %ile	max	*n*
$Log(Size\_Mcap)_{i,2011}$	25.812	1.788	21.490	24.470	26.257	27.256	28.434	116
$Goodwill_{i,2011}$	0.042	0.061	0.000	0.000	0.010	0.063	0.215	116
$R\&D_{i,2011}$	0.042	0.055	0.000	0.001	0.024	0.054	0.257	116
$SalesF_{i,2011}$	0.323	0.276	0.000	0.000	0.361	0.523	0.862	116
$ShareF_{i,2011}$	0.217	0.136	0.000	0.105	0.220	0.291	0.585	116
$Debt_{i,2011}$	0.471	0.190	0.071	0.337	0.485	0.621	0.876	116
$EBIT_{i,2011}$	0.088	0.099	-0.431	0.036	0.061	0.114	0.384	116
$FreeFloat_{i,2011}$	0.494	0.181	0.103	0.335	0.511	0.662	0.823	116

Panel B: $IFRS_i$ =0

	mean	stdev	min	25 %ile	median	75 %ile	max	*n*
$Log(Size\_Mcap)_{i,2011}$	25.546	1.627	21.736	24.417	25.662	26.713	28.434	116
$Goodwill_{i,2011}$	0.036	0.060	0.000	0.000	0.005	0.046	0.215	116
$R\&D_{i,2011}$	0.033	0.045	0.000	0.001	0.020	0.043	0.238	116
$SalesF_{i,2011}$	0.318	0.302	0.000	0.000	0.272	0.603	0.862	116
$ShareF_{i,2011}$	0.217	0.166	0.000	0.078	0.190	0.320	0.585	116
$Debt_{i,2011}$	0.448	0.207	0.090	0.265	0.459	0.609	0.935	116
$EBIT_{i,2011}$	0.089	0.084	-0.090	0.039	0.065	0.115	0.384	116
$FreeFloat_{i,2011}$	0.478	0.170	0.079	0.352	0.483	0.609	0.823	116

Panel C: Test of Differences

	Mean		Median	
	Difference	*t*-statistic	Difference	*z*-statistic
$Log(Size\_Mcap)_{i,2011}$	0.266	1.19	0.595	1.51
$Goodwill_{i,2011}$	0.006	0.70	0.005	1.69*
$R\&D_{i,2011}$	0.008	1.23	0.004	0.68
$SalesF_{i,2011}$	0.005	0.12	0.088	0.25
$ShareF_{i,2011}$	0.000	0.00	0.030	0.52
$Debt_{i,2011}$	0.024	0.91	0.026	0.90
$EBIT_{i,2011}$	-0.002	-0.16	-0.004	-0.46
$FreeFloat_{i,2011}$	0.017	0.72	0.028	0.82

Note: This table reports summary statistics for first-stage variables after propensity score matching. The variable definitions are as follows. $IFRS_i$ = dummy variable for observations of firms that adopted IFRS in our first-stage sample period; $Log(Size\_Mcap)_{i,2011}$ = natural logarithm of market capitalization at the end of 2011; $Goodwill_{i,2011}$ = ratio of goodwill to total assets at the end of fiscal year 2011; $R\&D_{i,2011}$ = ratio of R&D expenses to total sales in 2011; $SalesF_{i,2011}$ = ratio of foreign sales to total sales in 2011; $ShareF_{i,2011}$ = ratio of foreign shareholdings to total shareholdings at the end of fiscal year 2011; $Debt_{i,2011}$ = ratio of total liabilities to total assets at the end of fiscal year 2011; $EBIT_{i,2011}$ = ratio of EBIT to total sales in 2011; $FreeFloat_{i,2011}$ = ratio of free float at the end of fiscal year 2011. Subscripts *i* and 2011 represent firm and year 2011, respectively. * indicates two-tailed significance at the 0.10 level.

As our sample period includes the nine years from 2010 to 2018, we obtain 2088 firm-year observations (116 firms × 9 years × 2). Among them, we confine our second-stage sample to IFRS adopters and their counterparts with data available for three years before and after the treatment observations adopted IFRS (that is, six consecutive years including the first year of IFRS adoption). This restriction is to exclude potential biases due to differences in the IFRS adoption period. As a result, our second-state sample includes 840 firm-year observations (70 firms × 2 × 6 years).[15] Throughout the study, we winsorized the continuous variables in the top and bottom 0.5 percentiles by year to cope with the impact of potential outliers on our second-stage regression results.

3.2. Empirical models

We estimate Eqs. (2) and (3) to test the effect of voluntary IFRS adoption on information asymmetry and Eq. (4) to test its effect on earnings quality. Specifically, Eq. (2) is used to test Hypothesis 1_0 regarding the average effect of voluntary IFRS adoption on information asymmetry, proxied by the bid-ask spread. Eqs. (3) and (4) are used to test Hypotheses 2 and 3, respectively, regarding how firm size influences voluntary IFRS adoption's effect on information asymmetry and earnings quality proxied by absolute discretionary accruals.

$$Log(Bid\text{-}Ask\ Spread)_{i,t} = \beta_0 + \beta_1 IFRSPOST_{i,t} + \beta_2 IFRS_i + \beta_3 POST_t + \beta_4 Log(Size\_Mcap)_{i,t} + \beta_5 Log(Turnover)_{i,t} + \beta_6 Log(Volatility)_{i,t} + \beta_7 Log(FreeFloat)_{i,t} + \beta_8 Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_i + MatchingVariables_{i,t} + \varepsilon_{i,t} \quad (2)$$

[15] We confirm that the comparisons of firm characteristics between the 70 IFRS adopters and 70 matched firms are similar to those in Table 5.

$$Log(Bid\text{-}Ask\ Spread)_{i,t} = \gamma_0 + \gamma_1 IFRSPOST\_SMALL_{i,t} + \gamma_2 IFRSPOST\_MEDIUM_{i,t} + \gamma_3 IFRSPOST\_LARGE_{i,t} + \gamma_4 IFRS_i + \gamma_5 POST_t + \gamma_6 Log(Size\_Mcap)_{i,t} + \gamma_7 Log(Turnover)_{i,t} + \gamma_8 Log(Volatility)_{i,t} + \gamma_9 Log(FreeFloat)_{i,t} + \gamma_{10} Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_i + MatchingVariables_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$|DiscretionaryAccruals|_{i,t} = \theta_0 + \theta_1 IFRSPOST\_SMALL_{i,t} + \theta_2 IFRSPOST\_MEDIUM_{i,t} + \theta_3 IFRSPOST\_LARGE_{i,t} + \theta_4 IFRS_i + \theta_5 POST_t + \theta_6 Log(Size\_Mcap)_{i,t} + \theta_7 Debt_{i,t} + \theta_8 Growth_{i,t} + \theta_9 CFO_{i,t} + \theta_{10} AUD_{i,t} + \theta_{11} LOSS_{i,t} + \theta_{12} Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_i + MatchingVariables_{i,t} + \varepsilon_{i,t} \quad (4)$$

$Log(Bid\text{-}Ask\ Spread)_{i,t}$=natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end;
$|DiscretionaryAccruals|_{i,t}$=absolute value of firm i's cross-sectional discretionary accruals calculated in accordance with Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005);
$IFRS_i$=dummy variable that equals one if firm i is a voluntary IFRS adopter;
$IFRSPOST\_SMALL_{i,t}$=dummy variable that equals one if firm i is an IFRS adopter and its average $Log(Size\_Mcap)_{i,t}$ for three years before adopting IFRS (t–3 to t–1) is within the first tertile among 70 IFRS adopting firms in our second-stage sample and zero otherwise;
$IFRSPOST\_MEDIUM_{i,t}$=dummy variable that equals one if firm i is an IFRS adopter and its average $Log(Size\_Mcap)_{i,t}$ for three years before adopting IFRS (t–3 to t–1) is within the second tertile among 70 IFRS adopting firms in our second-stage sample and zero otherwise;
$IFRSPOST\_LARGE_{i,t}$=dummy variable that equals one if firm i is an IFRS adopter and its average $Log(Size\_Mcap)_{i,t}$ for three years before adopting IFRS (t–3 to t–1) is within the third tertile among 70 IFRS adopting firms in our second-stage sample and zero otherwise;
$POST_t$=dummy variable indicating the post-IFRS adoption period;
$IFRSPOST_{i,t}$=interaction term between $IFRS_i$ and $POST_t$;
$Log(Size\_Mcap)_{i,t}$=natural logarithm of end-of-month market capitalization;
$Log(Turnover)_{i,t}$=natural logarithm of the average daily share turnover (i.e., daily trading volume divided by daily number of shares issued) for three months after a firm's fiscal year-end;
$Log(Volatility)_{i,t}$=natural logarithm of the standard deviation of daily stock returns for three months after a firm's fiscal year-end;
$Log(FreeFloat)_{i,t}$=natural logarithm of the free float ratio;
$Log(Analyst)_{i,t}$=natural logarithm of the number of analysts following the firm;
$Debt_{i,t}$=ratio of total liabilities to total assets at firm i's fiscal year-end;
$Growth_{i,t}$=annual percentage change in sales for firm i;
$CFO_{i,t}$=ratio of operating cash flows to total assets at firm i's fiscal year-end;
$AUD_{i,t}$=dummy variable indicating if firm i is audited by a Big 4 firm;
$LOSS_{i,t}$=dummy variable indicating observations with negative net income;
$YearFixedEffect_t$=dummy variable indicating year fixed effects;
$IndustryFixedEffect_i$=dummy variable indicating industry fixed effects;
$MatchingVariables_{i,t}$=first-stage independent variables (that is, matching covariates), except those included in Eqs. (2), (3) and (4).

These models are designed to perform a difference-in-differences estimation with propensity score matching (i.e., DiD estimation with PSM), an estimation method commonly used in accounting and finance literature (Boubakri et al., 2016; Iliev et al., 2014; Guo et al., 2022).[16] The DiD methodology in our study quantifies the changes in information asymmetry and earnings quality of firms that voluntarily adopt IFRS relative to those of firms that do not, controlling for potential confounding effects of macro-economic factors unrelated to voluntary IFRS adoption's effect.

Our variables are generally based on those used in previous studies (Chen et al., 2010b; Leuz and Verrecchia, 2000). First, our proxy for information asymmetry in Eqs. (2) and (3) is bid-ask spread, which is suggested by previous studies (Cho et al., 2013; Leuz and Verrecchia, 2000) as an explicit measure of information asymmetry. Leuz and Verrecchia (2000) also use share turnover and the volatility of daily stock returns as proxies for information asymmetry. However, they point out that these variables are noisy proxies for information asymmetry. In other words, other factors unrelated to information asymmetry can affect them, resulting in measurement error problems in the dependent variables. For this reason, we rely solely on the bid-ask spread as our proxy for information asymmetry. Following Leuz and Verrecchia (2000), we assume a positive relationship between information asymmetry and bid-ask spread. Specifically, the bid-ask spread addresses the adverse selection problem that arises from transacting a firm's shares in the presence of asymmetrically informed investors. Less information asymmetry implies less adverse selection, which in turn implies a smaller bid-ask spread (Leuz and Verrecchia, 2000).

[16] An alternative method to cope with self-selection bias is a Heckman-type two-stage treatment effects model (Heckman, 1979). This method considers biases arising from self-selection as a type of correlated omitted variable bias. Therefore, it attempts to ameliorate the effects of biases by adding the inverse Mills ratio as an additional independent variable in an equation (Minutti-Meza, 2013, p. 793). However, for a Heckman-type two-stage treatment effects model to be correctly estimated, exclusion restrictions should be correctly identified, which is difficult in empirical accounting studies (Lennox et al., 2012; Minutti-Meza, 2013, p. 793). Therefore, we use PSM with a DiD analysis, which does not require exclusion restrictions (Lennox et al., 2012).

Following Leuz and Verrecchia (2000), we also employ log-log estimation because our dependent variable in Eqs. (2) and (3) is *Log (Bid-Ask Spread)*$_{i,t}$. Specifically, *Log(Bid-Ask Spread)*$_{i,t}$ is defined as the natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end. Based on Leuz and Verrecchia (2000), we include *Log(Size_Mcap)*$_{i,t}$, *Log(Turnover)*$_{i,t}$, *Log(Volatility)*$_{i,t}$, and *Log(FreeFloat)*$_{i,t}$ as control variables. We also control for analyst coverage, *Log(Analyst)*$_{i,t}$, and add industry and year fixed effects.

Second, based on previous studies (Ahmed et al., 2013; Barth et al., 2008; Chen et al., 2010b), our proxy for earnings quality in Eq. (4) is the absolute value of each firm's cross-sectional discretionary accruals. We choose discretionary accruals as a proxy for earnings quality because our hypothesis considers accounting flexibility, which is closely related to discretionary accruals, as an important cause of decreased earnings quality and views earnings management as one reason for decreased earnings quality for small- and medium-sized firms. We calculate the absolute value of cross-sectional discretionary accruals in four ways, consistent with the models widely used in previous studies. These models are the original Jones model (Jones, 1991), modified Jones model (Dechow et al., 1995), CFO-adjusted Jones model (Kasznik, 1999), and ROA-adjusted Jones model (Kothari et al., 2005). Following Barth et al. (2008), Chen et al. (2010b), and Ahmed et al. (2013), we assume a negative relationship between earnings quality and the absolute value of cross-sectional discretionary accruals. Based on Chen et al. (2010b), we include *Debt*$_{i,t}$, *Growth*$_{i,t}$, *CFO*$_{i,t}$, *AUD*$_{i,t}$, and *LOSS*$_{i,t}$ as control variables. We also control for analyst coverage, *Log(Analyst)*$_{i,t}$, and add industry and year fixed effects.[17]

The variable of interest in Eq. (2) for testing Hypothesis 1_0 is *IFRSPOST*$_{i,t}$. *IFRSPOST*$_{i,t}$ indicates an IFRS adopter after IFRS adoption. As we propose a null hypothesis, we do not predict any specific sign of *IFRSPOST*$_{i,t}$. The variable of interest in Eqs. (3) and (4) for testing Hypotheses 2 and 3 is *IFRSPOST_SMALL*$_{i,t}$, which indicates small- and medium-sized IFRS adopters in post-IFRS adoption periods. In the next subsection, we discuss how the first tertile among IFRS adopters matches the concept of small- and medium-sized firms in the first-stage sample. The coefficient of *IFRSPOST_SMALL*$_{i,t}$ captures the bid-ask spread change and absolute value of discretionary accruals when small- and medium-sized listed firms switch their financial reporting standards from J-GAAP to IFRS. According to our hypotheses, we expect that the coefficient of *IFRSPOST_SMALL*$_{i,t}$ is positive, which means that for small- and medium-sized listed firms, information asymmetry in the stock market increases and earnings quality decreases after voluntary IFRS adoption.

The final control variables in our second-stage equations are *MatchingVariables*$_{i,t}$. Since our matching point is 2011, the covariate values used at the matching point could change, reducing the quality of our matching. Therefore, we also include the first-stage matching variables as additional control variables in Eqs. (2), (3), and (4) to control for ex-post changes in the covariates, as suggested by Shipman et al. (2017). Specifically, in Eqs. (2), (3), and (4), we include the variables in Eq. (1) as additional control variables, excluding the variables included in Leuz and Verrecchia (2000) and Chen et al.'s (2010b) equations, which are our benchmarks for the second-stage DiD estimation with PSM. We describe them as *MatchingVariables*$_{i,t}$, and these results are not reported.

3.3. Data and summary statistics

We obtain financial and stock price-related data for both our first and second-stage regressions from Nikkei NEEDS Financial QUEST2.0. In addition, we obtain audit firm related data from Nikkei DVD/CD-ROM (audit firm and audit opinion data) and analyst

Table 6
Comparison of Firm Characteristics in IFRS Sample.

	SMALL [mean]	MEDIUM [mean]	LARGE [mean]
Number of analysts	1.638	6.903	10.826
Foreign ownership	0.158	0.237	0.337
Big 4 auditor	0.725	1.000	0.957
Sales growth	0.153	0.097	0.051
Goodwill/Total assets	0.037	0.044	0.045
R&D/Sales	0.027	0.040	0.070
Firm age (listing)	21.565	38.083	48.043
Total assets (yen)	86,300,000,000	589,000,000,000	2470,000,000,000
Number of employees	4470	20,128	41,435
Market capitalization (yen)	42,200,000,000	372,000,000,000	1750,000,000,000

Note: This table reports a comparison of firm characteristics in the IFRS sample. All characteristics are measured and presented as the mean value of three years before adopting IFRS (t–3 to t–1). Number of analysts = number of analysts following the firm; Foreign ownership = ratio of foreign shareholdings to total shareholdings at the end of the fiscal year; Big 4 auditor = dummy variable indicating whether the firm is audited by a Big 4 firm; Sales growth = annual percentage change in sales; Goodwill/Total assets = ratio of goodwill to total assets at the end of fiscal year; R&D/Sales = ratio of R&D expenses to total sales; Firm age (listing) = number of years from the year of listing on a stock exchange to the current year; Total assets (yen) = total assets measured in Japanese yen; Number of employees = number of firm employees; Market capitalization (yen) = market capitalization measured in Japanese yen.

[17] We do not include *XLIST*$_{i,t}$ (dummy variable indicating whether a firm is also listed on any U.S. stock exchange) in Eq. (4). The number of U.S. cross-listed firms in our sample is very small because we excluded firms converting from U.S. GAAP to IFRS, as shown in Table 1.

coverage-related data from IFIS consensus data.

In Table 6, we compare "small," "medium," and "large" IFRS adopters, where these terms indicate the classification among IFRS adopters based on $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$. As discussed earlier, we assume that firm size represents firms' reporting incentives and accounting resources. "Small" firms are expected to have weaker incentives to commit to transparent financial reporting and fewer accounting resources with which to adequately implement principles-based IFRS. We use the number of analysts, foreign ownership, Big 4 auditor, and sales growth as proxies for reporting incentives, and firm age, total assets, and number of employees as proxies for accounting resources. The number of analysts (Nobes and Perramon, 2013) and ownership of foreign investors, who are arm's-length investors and play a monitoring role (Guo et al., 2015; Kang and Stulz, 1997; Lel, 2019), are associated with market scrutiny. A Big 4 auditor is commonly viewed in the literature as an earnings management incentive (e.g., Capkun et al., 2016; Daske et al., 2013). We relate sales growth to firm growth. We also relate firm age, total assets, and the number of employees to firms' accounting resources. Firms with large total assets, maturity, and large employee bases are expected to be able to allocate employees toward and spend more on financial report preparation. In addition, we use goodwill and research and development expenditures as proxies for accounting verifiability.[18] Table 6 shows that "small" adopters are growing, less likely to hire Big 4 auditors, less likely to be followed by security analysts, followed by fewer analysts, and owned by fewer foreign investors. In addition, they are younger and have fewer employees. Thus, our firm size classification captures firm incentives to commit to transparent financial reporting and commit available accounting resources to implement principles-based IFRS. In other words, similar to small-

Table 7
Univariate DiD Analysis with PSM.

Panel A: Full sample

	$POST_t = 0$			$POST_t = 1$			
	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	**Difference-in-differences**
$Log(Bid\text{-}Ask\ Spread)_{i,t}$	-5.811	-5.917	**-0.106**	-6.164	-6.206	**-0.042**	**0.064**
$\lvert DiscretionaryAccruals\rvert_{OJONESi,t}$	0.034	0.032	**-0.002**	0.030	0.034	**0.004**	**0.006**
$\lvert DiscretionaryAccruals\rvert_{MJONESi,t}$	0.034	0.031	**-0.003**	0.030	0.034	**0.004**	**0.007**
$\lvert DiscretionaryAccruals\rvert_{CFOADJi,t}$	0.030	0.027	**-0.003**	0.026	0.029	**0.003**	**0.006**
$\lvert DiscretionaryAccruals\rvert_{ROAADJi,t}$	0.033	0.032	**-0.001**	0.029	0.032	**0.003**	**0.004**

Panel B: "Small" firm sample

	$POST_t = 0$			$POST_t = 1$			
	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	**Difference-in-differences**
$Log(Bid\text{-}Ask\ Spread)_{i,t}$	-5.519	-5.320	**0.199**	-5.862	-5.631	**0.231***	**0.032**
$\lvert DiscretionaryAccruals\rvert_{OJONESi,t}$	0.033	0.040	**0.007**	0.032	0.049	**0.017***	**0.010**
$\lvert DiscretionaryAccruals\rvert_{MJONESi,t}$	0.034	0.039	**0.005**	0.032	0.051	**0.019****	**0.014**
$\lvert DiscretionaryAccruals\rvert_{CFOADJi,t}$	0.026	0.035	**0.009**	0.027	0.042	**0.015****	**0.006**
$\lvert DiscretionaryAccruals\rvert_{ROAADJi,t}$	0.034	0.040	**0.006**	0.030	0.047	**0.017****	**0.011**

Panel C: "Medium" firm sample

	$POST_t = 0$			$POST_t = 1$			
	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	**Difference-in-differences**
$Log(Bid\text{-}Ask\ Spread)_{i,t}$	-6.005	-6.204	**-0.199****	-6.277	-6.391	**-0.114**	**0.085**
$\lvert DiscretionaryAccruals\rvert_{OJONESi,t}$	0.031	0.028	**-0.003**	0.032	0.029	**-0.003**	**0.000**
$\lvert DiscretionaryAccruals\rvert_{MJONESi,t}$	0.030	0.028	**-0.002**	0.032	0.028	**-0.004**	**-0.002**
$\lvert DiscretionaryAccruals\rvert_{CFOADJi,t}$	0.027	0.023	**-0.004**	0.026	0.024	**-0.002**	**0.002**
$\lvert DiscretionaryAccruals\rvert_{ROAADJi,t}$	0.031	0.028	**-0.003**	0.031	0.025	**-0.006**	**-0.003**

Panel D: "Large" firm sample

	$POST_t = 0$			$POST_t = 1$			
	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	$IFRS_i = 0$	$IFRS_i = 1$	**Difference**	**Difference-in-differences**
$Log(Bid\text{-}Ask\ Spread)_{i,t}$	-5.900	-6.213	**-0.313*****	-6.350	-6.587	**-0.237*****	**0.076**
$\lvert DiscretionaryAccruals\rvert_{OJONESi,t}$	0.037	0.028	**-0.009****	0.027	0.024	**-0.003**	**0.006**
$\lvert DiscretionaryAccruals\rvert_{MJONESi,t}$	0.037	0.027	**-0.010****	0.027	0.024	**-0.003**	**0.007**
$\lvert DiscretionaryAccruals\rvert_{CFOADJi,t}$	0.035	0.024	**-0.011****	0.026	0.022	**-0.004**	**0.007**
$\lvert DiscretionaryAccruals\rvert_{ROAADJi,t}$	0.034	0.028	**-0.006**	0.025	0.024	**-0.001**	**0.005**

Note: This table reports the results of univariate difference-in-differences tests of means. $Log(Bid\text{-}Ask\ Spread)_{i,t}$ = natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end; $\lvert DiscretionaryAccruals\rvert_{i,t}$ = absolute value of firm i's cross-sectional discretionary accruals calculated in accordance with Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005). Subscripts i and t represent firm and year, respectively. ***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively

[18] Among the four differences in accounting standards between J-GAAP and IFRS, these two differences are particularly relevant to accounting verifiability because they involve recognition and measurement processes.

Table 8
Correlation Matrix for Variables of Second-stage DiD Estimation with PSM.

		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)
$IFRSPOST_{i,t}$	(a)		0.518	0.530	0.518	-0.187	0.130	0.052	-0.023	-0.023	-0.001	-0.022	-0.006	-0.038	-0.011	0.018	-0.042	-0.050	0.108	-0.023
$IFRSPOST\_SMALL_{i,t}$	(b)	0.518		-0.092	-0.090	0.157	-0.299	0.129	0.149	-0.114	-0.276	0.052	0.074	0.060	0.078	0.009	0.016	-0.071	-0.034	0.068
$IFRSPOST\_MEDIUM_{i,t}$	(c)	0.530	-0.092		-0.092	-0.189	0.106	-0.003	-0.083	-0.028	0.034	-0.015	-0.018	-0.052	-0.050	0.024	-0.083	0.008	0.121	-0.030
$IFRSPOST\_LARGE_{i,t}$	(d)	0.518	-0.090	-0.092		-0.258	0.395	-0.044	-0.101	0.107	0.240	-0.071	-0.066	-0.067	-0.045	-0.006	0.003	-0.015	0.080	-0.074
$Log(Bid\text{-}Ask\ Spread)_{i,t}$	(e)	-0.155	0.174	-0.166	-0.249		-0.606	-0.094	0.330	-0.229	-0.494	0.085	0.092	0.126	0.091	0.076	-0.025	-0.140	-0.108	0.204
$Log(Size\_Mcap)_{i,t}$	(f)	0.126	-0.289	0.120	0.365	-0.663		0.050	-0.217	0.336	0.822	-0.125	-0.131	-0.145	-0.111	-0.089	0.003	0.130	0.171	-0.173
$Log(Turnover)_{i,t}$	(g)	0.086	0.119	0.015	0.002	-0.250	0.108		0.479	0.223	0.238	0.089	0.095	0.109	0.070	0.079	0.090	0.004	0.117	0.096
$Log(Volatility)_{i,t}$	(h)	-0.005	0.169	-0.073	-0.103	0.300	-0.217	0.488		-0.161	-0.112	0.101	0.105	0.138	0.094	0.027	0.144	-0.011	-0.006	0.111
$Log(FreeFloat)_{i,t}$	(i)	-0.053	-0.133	-0.022	0.072	-0.283	0.304	0.258	-0.119		0.270	-0.077	-0.082	-0.076	-0.109	-0.025	-0.089	-0.137	0.015	0.065
$Log(Analyst)_{i,t}$	(j)	0.026	-0.277	0.084	0.231	-0.608	0.828	0.256	-0.113	0.240		-0.094	-0.095	-0.103	-0.092	-0.101	-0.023	0.158	0.185	-0.141
$\lvert DiscretionaryAccruals\rvert_{\mathrm{OJONES}i,t}$	(k)	0.024	0.144	-0.033	-0.072	0.141	-0.189	0.040	0.088	-0.078	-0.155		0.954	0.702	0.756	0.070	0.033	0.053	-0.083	0.171
$\lvert DiscretionaryAccruals\rvert_{\mathrm{MJONES}i,t}$	(l)	0.027	0.157	-0.041	-0.072	0.149	-0.192	0.033	0.088	-0.080	-0.157	0.980		0.702	0.781	0.064	0.009	0.060	-0.082	0.176
$\lvert DiscretionaryAccruals\rvert_{\mathrm{CFOADJ}i,t}$	(m)	0.023	0.145	-0.042	-0.066	0.177	-0.202	0.069	0.143	-0.065	-0.169	0.830	0.837		0.589	0.074	0.096	0.007	-0.129	0.231
$\lvert DiscretionaryAccruals\rvert_{\mathrm{ROAADJ}i,t}$	(n)	0.011	0.145	-0.062	-0.064	0.134	-0.172	0.017	0.071	-0.108	-0.154	0.891	0.910	0.732		0.036	0.087	0.155	-0.118	0.067
$Debt_{i,t}$	(o)	0.026	0.017	0.020	0.004	0.087	-0.091	0.073	0.003	-0.047	-0.113	0.090	0.094	0.103	0.077		-0.027	-0.286	-0.084	0.200
$Growth_{i,t}$	(p)	0.047	0.137	-0.066	0.003	-0.007	-0.048	0.162	0.199	-0.057	-0.075	0.091	0.075	0.135	0.113	-0.013		0.235	-0.009	-0.149
$CFO_{i,t}$	(q)	-0.075	-0.104	0.001	-0.016	-0.085	0.094	-0.082	-0.034	-0.189	0.155	0.112	0.107	0.057	0.213	-0.230	0.066		0.058	-0.265
$AUD_{i,t}$	(r)	0.107	-0.035	0.121	0.080	-0.142	0.202	0.092	0.003	0.009	0.200	-0.154	-0.154	-0.169	-0.166	-0.097	-0.055	0.047		-0.059
$LOSS_{i,t}$	(s)	-0.023	0.068	-0.030	-0.074	0.250	-0.178	0.075	0.133	0.069	-0.165	0.194	0.206	0.282	0.109	0.213	-0.053	-0.257	-0.059	

Note: This table reports the correlation matrix of our second-stage variables. The lower (upper) cells present Pearson (Spearman) correlations. $IFRSPOST_{i,t}$ = dummy variable indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (t–3 to t–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; $Log(Bid\text{-}Ask\ Spread)_{i,t}$ = natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end; $Log(Turnover)_{i,t}$ = natural logarithm of the average daily share turnover (i.e., daily trading volume divided by daily number of shares issued) for three months after a firm's fiscal year-end; $Log(Volatility)_{i,t}$ = natural logarithm of the standard deviation of daily stock returns for three months after a firm's fiscal year-end; $Log(FreeFloat)_{i,t}$ = natural logarithm of the ratio of free float; $Log(Analyst)_{i,t}$ = natural logarithm of the number of analysts following the firm; $\lvert DiscretionaryAccruals\rvert_{i,t}$ = absolute value of firm i's cross-sectional discretionary accruals calculated in accordance with Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005); $Debt_{i,t}$ = ratio of total liabilities to total assets at the end of firm i's fiscal year-end; $Growth_{i,t}$ = annual percentage change in sales for firm i; $CFO_{i,t}$ = ratio of operating cash flows to total assets at the end of firm i's fiscal year; $AUD_{i,t}$ = dummy variable indicating whether firm i is audited by a Big 4 firm; $LOSS_{i,t}$ = dummy variable indicating observations with negative net income (NI<0). Subscripts i and t represent firm and year, respectively.

and medium-sized firms in the first-stage sample, "small" IFRS adopters are expected to have fewer incentives to commit to transparent financial reporting and fewer accounting resources. Moreover, there are some differences in accounting verifiability (book goodwill and research and development expenditures) between "small" and "large" adopters. We conduct an additional analysis using these variables to explore the channels through which IFRS adoption, switching from a rules-based to a principles-based accounting approach, affects information asymmetry and earnings quality, and to validate the constructs underlying firm size (i.e., the reporting incentive and accounting resource explanations).

Table 7 presents the results of the univariate DiD tests. We compare the means of bid-ask spread and discretionary accruals; Panel A reports the result for the full sample. Panels B, C, and D report the results for the "small," "medium," and "large" firm samples, respectively. In Panel A, we do not observe differences between IFRS adopters and non-adopters in either bid-ask spread or discretionary accruals. On average, voluntary IFRS adoption in Japan does not seem to affect information asymmetry in the stock market or voluntary IFRS adopters' earnings quality. In Panel B, the differences in the bid-ask spread and discretionary accruals between IFRS adopters and non-adopters are not statistically significant before IFRS adoption, but they are statistically significant after IFRS adoption. However, the difference-in-differences of both bid-ask spread and discretionary accruals between pre- and post-IFRS adoption is not statistically significant. Thus, the changes in bid-ask spread and discretionary accruals are not peculiar to "small" IFRS adopters but also apply to "small" non-adopters. Similarly, we do not observe changes in bid-ask spread and discretionary accruals that are peculiar to "medium" and "large" IFRS adopters. However, these preliminary results are based on univariate tests and should be interpreted with caution. Specifically, these results do not consider the effects of changes in institutional environments, such as corporate governance requirements and changes in firm characteristics. Therefore, in the next section, we conduct multivariate regression after considering these effects.

Table 8 presents Pearson and Spearman correlations (below and above the diagonal, respectively). In addition to the results of our simple DiD test, we also indicate the potential effect of IFRS adoption for "small" firms by showing the correlation matrix. Specifically, the Pearson (Spearman) correlation between $IFRSPOST\_SMALL_{i,t}$ and $Log(Bid\text{-}Ask\ Spread)_{i,t}$ is 0.174 (0.157), and correlations with the four proxies for the absolute value of cross-sectional discretionary accruals are 0.144 (0.052), 0.157 (0.074), 0.145 (0.060), and 0.145 (0.078), respectively. These univariate results suggest that both the bid-ask spread and the discretionary accruals of "small" firms

Table 9
Multivariate Regression Results—DiD with Propensity Score Matching ($H1_0$ and H2).

	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
constant	-0.7760	-0.76	-0.8954	-0.85
$IFRSPOST_{i,t}$	0.0721	2.03**		
$IFRSPOST\_SMALL_{i,t}$			0.1332	2.07**
$IFRSPOST\_MEDIUM_{i,t}$			0.0139	0.29
$IFRSPOST\_LARGE_{i,t}$			0.0718	0.74
$IFRS_i$	0.0152	0.26	0.0138	0.24
$POST_t$	-0.1731	-3.23***	-0.1761	-3.26***
$Log(Size\_Mcap)_{i,t}$	-0.1615	-4.03***	-0.1590	-3.84***
$Log(Turnover)_{i,t}$	-0.2032	-3.72***	-0.2059	-3.83***
$Log(Volatility)_{i,t}$	0.5192	5.63***	0.5136	5.46***
$Log(FreeFloat)_{i,t}$	0.0033	0.03	0.0033	0.03
$Log(Analyst)_{i,t}$	-0.1688	-2.34**	-0.1628	-2.31**
$YearFixedEffect_t$	Included		Included	
$IndustryFixedEffect_i$	Included		Included	
$MatchingVariables_{i,t}$	Included		Included	
$Adj.R^2$	0.6267		0.6269	
N	840		840	

Note: This table reports the results of our multivariate regression for $H1_0$ and H2 using DiD with PSM:
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \beta_0 + \beta_1 IFRSPOST_{i,t} + \beta_2 IFRS_i + \beta_3 POST_t + \beta_4 Log(Size\_Mcap)_{i,t} + \beta_5 Log(Turnover)_{i,t} + \beta_6 Log(Volatility)_{i,t} + \beta_7 Log(FreeFloat)_{i,t} + \beta_8 Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_i + MatchingVariables_{i,t} + \varepsilon_{i,t}$ (a);
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \gamma_0 + \gamma_1 IFRSPOST\_SMALL_{i,t} + \gamma_2 IFRSPOST\_MEDIUM_{i,t} + \gamma_3 IFRSPOST\_LARGE_{i,t} + \gamma_4 IFRS_i + \gamma_5 POST_t + \gamma_6 Log(Size\_Mcap)_{i,t} + \gamma_7 Log(Turnover)_{i,t} + \gamma_8 Log(Volatility)_{i,t} + \gamma_9 Log(FreeFloat)_{i,t} + \gamma_{10} Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_i + MatchingVariables_{i,t} + \varepsilon_{i,t}$ (b).
$Log(Bid\text{-}Ask\ Spread)_{i,t}$ = natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end; $IFRSPOST_{i,t}$ = dummy variable indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (t–3 to t–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; $IFRS_i$ = dummy variable that equals one if firm i is a voluntary IFRS adopter; $Post_t$ = dummy variable indicating the post-IFRS adoption period; $Log(Size\_Mcap)_{i,t}$ = natural logarithm of end-of-month market capitalization; $Log(Turnover)_{i,t}$ = natural logarithm of the average daily share turnover (i.e., daily trading volume divided by daily number of shares issued) for three months after a firm's fiscal year-end; $Log(Volatility)_{i,t}$ = natural logarithm of the standard deviation of daily stock returns for three months after a firm's fiscal year-end; $Log(FreeFloat)_{i,t}$ = natural logarithm of the ratio of free float; $Log(Analyst)_{i,t}$ = natural logarithm of the number of analysts following the firm; $YearFixedEffect_t$ = dummy variable indicating year fixed effects; $IndustryFixedEffect_i$ = dummy variable indicating industry fixed effects; $MatchingVariables_{i,t}$ = first-stage independent variables (i.e., matching covariates), excluding those included in Eqs. (2), (3), and (4). Subscripts i and t represent firm and year, respectively. *** and ** indicate two-tailed significance at the 0.01 and 0.05 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009).

Table 10
Multivariate Regression Results – DiD with Propensity Score Matching (H3).

	(1) $\lvert DiscretionaryAccruals\rvert_{OJONES_{i,t}}$		(2) $\lvert DiscretionaryAccruals\rvert_{MJONES_{i,t}}$		(3) $\lvert DiscretionaryAccruals\rvert_{CFOADJ_{i,t}}$		(4) $\lvert DiscretionaryAccruals\rvert_{ROAADJ_{i,t}}$	
	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE
constant	0.1176*	0.0954	0.1113	0.0852	0.0879**	0.0724*	0.0846	0.0575
	(1.72)	(1.53)	(1.58)	(1.32)	(2.03)	(1.90)	(1.30)	(0.92)
$IFRSPOST_{i,t}$	0.0061*		0.0068*		0.0049*		0.0061**	
	(1.78)		(1.92)		(1.71)		(2.49)	
$IFRSPOST\_SMALL_{i,t}$		0.0158**		0.0185**		0.0117**		0.0184***
		(2.09)		(2.36)		(2.53)		(2.70)
$IFRSPOST\_MEDIUM_{i,t}$		0.0015		0.0007		0.0016		-0.0008
		(0.40)		(0.20)		(0.35)		(−0.24)
$IFRSPOST\_LARGE_{i,t}$		0.0010		0.0013		0.0015		0.0009
		(0.25)		(0.32)		(0.37)		(0.29)
$IFRS_i$	-0.0004	-0.0009	-0.0007	-0.0012	-0.0002	-0.0006	-0.0003	-0.0008
	(−0.15)	(−0.34)	(−0.26)	(−0.49)	(−0.09)	(−0.22)	(−0.10)	(−0.34)
$POST_t$	-0.0049	-0.0052	-0.0062	-0.0065	-0.0041	-0.0043	-0.0075**	-0.0079**
	(−1.18)	(−1.30)	(−1.46)	(−1.62)	(−1.18)	(−1.28)	(−2.09)	(−2.35)
$Log(Size\_Mcap)_{i,t}$	-0.0037	-0.0028	-0.0035	-0.0024	-0.0029	-0.0023	-0.0024	-0.0014
	(−1.18)	(−0.97)	(−1.07)	(−0.81)	(−1.55)	(−1.34)	(−0.82)	(−0.48)
$Debt_{i,t}$	0.0167	0.0172	0.0146	0.0152	0.0115	0.0119	0.0166	0.0172
	(1.15)	(1.18)	(0.95)	(0.99)	(1.37)	(1.40)	(1.21)	(1.24)
$Growth_{i,t}$	0.0101	0.0071	0.0073	0.0036	0.0160	0.0139	0.0134	0.0095
	(0.54)	(0.41)	(0.39)	(0.21)	(1.35)	(1.29)	(0.74)	(0.59)
$CFO_{i,t}$	0.1079	0.1126	0.1126	0.1183	0.0608	0.0641	0.1644**	0.1704**
	(1.31)	(1.40)	(1.31)	(1.42)	(0.86)	(0.92)	(2.30)	(2.49)
$AUD_{i,t}$	-0.0109*	-0.0110*	-0.0108*	-0.0110*	-0.0093*	-0.0094*	-0.0112*	-0.0114*
	(−1.81)	(−1.87)	(−1.70)	(−1.77)	(−1.72)	(−1.76)	(−1.70)	(−1.76)
$LOSS_{i,t}$	0.0240***	0.0234***	0.0248***	0.0241***	0.0297***	0.0293***	0.0132**	0.0125**
	(3.22)	(3.09)	(3.30)	(3.15)	(5.72)	(5.55)	(2.29)	(2.13)
$Log(Analsyt)_{i,t}$	0.0010	0.0011	0.0007	0.0009	0.0012	0.0014	-0.0019	-0.0016
	(0.23)	(0.27)	(0.16)	(0.21)	(0.44)	(0.48)	(−0.49)	(−0.42)
$YearFixedEffect_t$	Included	Included	Included	Included	Included	Included	Included	Included
$IndustryFixedEffect_i$	Included	Included	Included	Included	Included	Included	Included	Included
$MatchingVariables_{i,t}$	Included	Included	Included	Included	Included	Included	Included	Included
$Adj.R^2$	0.1717	0.1772	0.1716	0.1803	0.2217	0.2250	0.2044	0.2163
N	836	836	836	836	836	836	836	836

Note: This table reports the results of our multivariate regression for H3 using DiD with PSM:
$\lvert DiscretionaryAccruals\rvert_{i,t} = \theta_0 + \theta_1 IFRSPOST_{i,t} + \theta_2 IFRS_i + \theta_3 POST_t + \theta_4 Log(Size\_Mcap)_{i,t} + \theta_5 Debt_{i,t} + \theta_6 Grwoth_{i,t} + \theta_7 CFO_{i,t} + \theta_8 AUD_{i,t} + \theta_9 LOSS_{i,t} + \theta_{10} Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_t + MatchingVariables_{i,t} + \varepsilon_{i,t}$ (a);
$\lvert DiscretionaryAccruals\rvert_{i,t} = \theta_0 + \theta_1 IFRSPOST\_SMALL_{i,t} + \theta_2 IFRSPOST\_MEDIUM_{i,t} + \theta_3 IFRSPOST\_LARGE_{i,t} + \theta_4 IFRS_i + \theta_5 POST_t + \theta_6 Log(Size\_Mcap)_{i,t} + \theta_7 Debt_{i,t} + \theta_8 Grwoth_{i,t} + \theta_9 CFO_{i,t} + \theta_{10} AUD_{i,t} + \theta_{11} LOSS_{i,t} + \theta_{12} Log(Analyst)_{i,t} + YearFixedEffect_t + IndustryFixedEffect_i + MatchingVariables_{i,t} + \varepsilon_{i,t}$ (b).
$\lvert DiscretionaryAccruals\rvert_{i,t}$ = absolute value of firm *i*'s cross-sectional discretionary accruals calculated in accordance with Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005); $IFRSPOST_{i,t}$ = dummy variable indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (*t*–3 to *t*–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; $IFRS_i$ = dummy variable that equals one if firm *i* is a voluntary IFRS adopter; $Post_t$ = dummy variable indicating the post-IFRS adoption period; $Log(Size\_Mcap)_{i,t}$ = natural logarithm of end-of-month market capitalization; $Debt_{i,t}$ = ratio of total liabilities to total assets at the end of firm *i*'s fiscal year-end; $Growth_{i,t}$ = annual percentage change in sales for firm *i*; $CFO_{i,t}$ = ratio of operating cash flows to total assets at the end of firm *i*'s fiscal year; $AUD_{i,t}$ = dummy variable indicating whether firm *i* is audited by a Big 4 firm; $LOSS_{i,t}$ = dummy variable indicating observations with negative net income (NI<0); $Log(A\_Following)_{i,t}$ = natural logarithm of the number of analysts following the firm; $YearFixedEffect_t$ = dummy variable indicating year fixed effects; $IndustryFixedEffect_i$ = dummy variable indicating industry fixed effects; $MatchingVariables_{i,t}$ = first-stage independent variables (that is, matching covariates), excluding those included in Eqs. (2), (3), and (4). Subscripts *i* and *t* represent firm and year, respectively. ***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009).

increased after IFRS adoption, consistent with our hypotheses. In contrast, correlations between *IFRSPOST_MEDIUM*$_{i,t}$ and *Log(Bid-Ask Spread)*$_{i,t}$ are −0.166 (−0.189), and correlations with the four proxies for the absolute value of cross-sectional discretionary accruals are −0.033 (−0.015), −0.041 (−0.018), −0.042 (−0.052), and −0.062 (−0.050). These results suggest that both the bid-ask spread and the discretionary accruals of "medium" firms decreased after IFRS adoption. However, since these results are univariate and preliminary, we conduct multivariate analyses to confirm our findings in the next section.

4. Results

4.1. Main analysis

Tables 9 and 10 show the results of testing the main hypotheses presented in Section 2. Specifically, Table 9 presents the estimation results of Eqs. (2) and (3), testing Hypotheses 1_0 and 2 on how IFRS adoption affects information asymmetry. Table 10 presents the estimation results of Eq. (4), testing Hypothesis 3 on how IFRS adoption affects earnings quality.

In Column (a) of Table 9, which is our baseline regression, the coefficient for *IFRSPOST*$_{i,t}$ is 0.0721 and statistically significant at the 5 % level ($t = 2.03$), indicating that on average, the bid-ask spread increases after voluntary IFRS adoption for consolidated financial statements. Regarding Hypothesis 1_0, this result suggests that voluntary IFRS adopters experience an increase in information asymmetry in the stock market. However, Column (b) of Table 9, which splits *IFRSPOST*$_{i,t}$ into *IFRSPOST_SMALL*$_{i,t}$, *IFRSPOST_MEDIUM*$_{i,t}$, and *IFRSPOST_LARGE*$_{i,t}$, shows that the bid-ask spread increase is mainly driven by "small" firms rather than "medium" and "large" firms, consistent with Hypothesis 2. Specifically, the coefficients of *IFRSPOST_SMALL*$_{i,t}$, *IFRSPOST_MEDIUM*$_{i,t}$, and *IFRSPOST_LARGE*$_{i,t}$ are 0.1332, 0.0139, and 0.0718, respectively; however, only the coefficient for *IFRSPOST_SMALL*$_{i,t}$ ($t = 2.07$) is statistically significant at the 5 % level. Thus, the result of the average effects of voluntary IFRS adoption on information asymmetry ($H1_0$) is driven by "small" firms (H2).

Considering how voluntary IFRS adoption affects earnings quality, we observe results similar to those for the bid-ask spread. Specifically, in Column (a) of Table 10, which is our baseline regression, the coefficients of *IFRSPOST*$_{i,t}$ are 0.0061, 0.0068, 0.0049, and 0.0061 for the Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005) models, respectively, and are statistically significant at the 5 % or 10 % level ($t = 1.78$, 1.92, 1.71, and 2.49, respectively). This suggests that, on average, the absolute value of cross-sectional discretionary accruals, our proxy for earnings quality, increases after firms prepare and report their consolidated financial statements in accordance with IFRS instead of J-GAAP. Similarly, Column (b) of Table 10 shows that the increase in discretionary accruals is driven mainly by "small" rather than "medium" and "large" firms, consistent with Hypothesis 3. Specifically, the coefficients of *IFRSPOST_SMALL*$_{i,t}$ are 0.0158, 0.0185, 0.0117, and 0.0184 for the Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005) models, respectively, and are statistically significant at the 5 % or 1 % level, depending on the model ($t = 2.09$, 2.36, 2.53, and 2.70, respectively).

Combined, these results suggest that "small" firms decrease their earnings quality, increasing information asymmetry in the stock market. This implies that voluntary IFRS adoption does not necessarily indicate a strong commitment to transparent financial reporting in Japan, where local accounting standards and IFRS are similar and local accounting standards and national accounting practices tend to be more rules-based. Our findings also imply that "small" firms exploit the management discretion inherent in a principles-based approach (IFRS) compared to a rules-based approach (J-GAAP) and have limited resources for implementing IFRS. Note that as the results for "medium" and "large" firms indicate, voluntary IFRS adoption does not adversely affect information asymmetry in the Japanese stock market when firms face stronger monitoring mechanisms and have accounting resources.

4.2. Robustness tests

In this subsection, we report several tests performed to confirm the robustness of the main results. Specifically, we examine whether our main results are robust to changing the bid-ask spread measurement period; setting a caliper distance of 0.10, 0.03, and 0.01; and using different definitions for the firm size classification.

First, Table 11 presents the results of changing the bid-ask spread measurement period. In the main analysis, we measure the bid-ask spread for three months after a firm's fiscal year. In the robustness test, we remeasure bid-ask spread and stock market-related control variables for one month, six months, and one year after a firm's fiscal year. As shown in Panels A, B, and C of Table 11,

Table 11
Robustness Tests Results – Changing Measurement Period of Bid-Ask Spread.

Panel A: 1MONTH				
	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
$IFRSPOST_{i,t}$	0.0652	1.62		
$IFRSPOST\_SMALL_{i,t}$			0.1420	1.69*
$IFRSPOST\_MEDIUM_{i,t}$			-0.0202	-0.41
$IFRSPOST\_LARGE_{i,t}$			0.0776	0.94
Other variables	Included		Included	
$Adj.R^2$	0.6030		0.6042	
N	840		840	
Panel B: 6MONTHS				
	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
$IFRSPOST_{i,t}$	0.0812	2.34**		
$IFRSPOST\_SMALL_{i,t}$			0.1405	1.81*
$IFRSPOST\_MEDIUM_{i,t}$			0.0020	0.04
$IFRSPOST\_LARGE_{i,t}$			0.1032	1.14
Other variables	Included		Included	
$Adj.R^2$	0.6102		0.6111	
N	840		840	
Panel C: 1YEAR				
	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
$IFRSPOST_{i,t}$	0.0741	2.14**		
$IFRSPOST\_SMALL_{i,t}$			0.1393	1.99**
$IFRSPOST\_MEDIUM_{i,t}$			-0.0040	-0.07
$IFRSPOST\_LARGE_{i,t}$			0.0886	1.11
Other variables	Included		Included	
$Adj.R^2$	0.6060		0.6070	
N	840		840	

Note: This table reports robustness test results after changing the bid-ask spread measurement period:
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \beta_0 + \beta_1 IFRSPOST_{i,t} + Controls + \varepsilon_{i,t}$ (a);
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \gamma_0 + \gamma_1 IFRSPOST\_SMALL_{i,t} + \gamma_2 IFRSPOST\_MEDIUM_{i,t} + \gamma_3 IFRSPOST\_LARGE_{i,t} + Controls + \varepsilon_{i,t}$ (b).
$Log(Bid\text{-}Ask\ Spread)_{i,t}$ = natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for one month (Panel A), six months (Panel B), and one year (Panel C) after a firm's fiscal year-end; $IFRSPOST_{i,t}$ = dummy variable indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (*t*–3 to *t*–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; *Controls* = other variables included in Eqs. (2) and (3). Subscripts *i* and *t* represent firm and year, respectively. ** and * indicate two-tailed significance at the 0.05 and 0.10 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009).

Table 12
Robustness Test Results of Information Asymmetry—Imposing a Caliper Distance.

Panel A: Caliper distance 0.10				
	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
$IFRSPOST_{i,t}$	0.1301	2.69***		
$IFRSPOST\_SMALL_{i,t}$			0.1702	2.20**
$IFRSPOST\_MEDIUM_{i,t}$			0.0733	1.28
$IFRSPOST\_LARGE_{i,t}$			0.1489	1.26
Other variables	Included		Included	
$Adj.R^2$	0.6393		0.6391	
N	840		840	
Panel B: Caliper distance 0.03				
	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
$IFRSPOST_{i,t}$	0.1247	2.51**		
$IFRSPOST\_SMALL_{i,t}$			0.1772	2.20**
$IFRSPOST\_MEDIUM_{i,t}$			0.0820	1.36
$IFRSPOST\_LARGE_{i,t}$			0.1004	0.93
Other variables	Included		Included	
$Adj.R^2$	0.6342		0.6339	
N	708		708	
Panel C: Caliper distance 0.01				
	(a) BASE		(b) WHOLE	
	coefficient	*t*-statistic	coefficient	*t*-statistic
$IFRSPOST_{i,t}$	0.1072	2.09**		
$IFRSPOST\_SMALL_{i,t}$			0.1519	1.77*
$IFRSPOST\_MEDIUM_{i,t}$			0.0548	0.82
$IFRSPOST\_LARGE_{i,t}$			0.1055	0.81
Other variables	Included		Included	
$Adj.R^2$	0.6421		0.6416	
N	624		624	

Note: This table reports the robustness test results of imposing a caliper distance of 0.10, 0.03, and 0.01:
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \beta_0 + \beta_1 IFRSPOST_{i,t} + Controls + \varepsilon_{i,t}$ (a);
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \gamma_0 + \gamma_1 IFRSPOST\_SMALL_{i,t} + \gamma_2 IFRSPOST\_MEDIUM_{i,t} + \gamma_3 IFRSPOST\_LARGE_{i,t} + Controls + \varepsilon_{i,t}$ (b).
$Log\ (Bid\text{-}Ask\ Spread)_{i,t}$ = natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end; $IFRSPOST_{i,t}$ = dummy variable indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (*t*–3 to *t*–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; *Controls* = other variables included in Eqs. (2) and (3). Subscripts *i* and *t* represent firm and year, respectively. ***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009).

Table 13
Robustness Tests Results of Earnings Quality—Imposing a Caliper Distance.

Panel A: Caliper Distance = 0.10

	(1) $\lvert DiscretionaryAccruals\rvert_{OJONES i,t}$		(2) $\lvert DiscretionaryAccruals\rvert_{MJONES i,t}$		(3) $\lvert DiscretionaryAccruals\rvert_{CFOADJ i,t}$		(4) $\lvert DiscretionaryAccruals\rvert_{ROAADJ i,t}$	
	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE
$IFRSPOST_{i,t}$	0.0056		0.0070		0.0054		0.0074**	
	(1.33)		(1.61)		(1.53)		(2.33)	
$IFRSPOST\_SMALL_{i,t}$		0.0153**		0.0183**		0.0177**		0.0182***
		(1.98)		(2.32)		(2.38)		(2.61)
$IFRSPOST\_MEDIUM_{i,t}$		-0.0001		-0.0001		0.0015		-0.0007
		(−0.01)		(−0.02)		(0.26)		(−0.17)
$IFRSPOST\_LARGE_{i,t}$		-0.0012		0.0001		0.0016		0.0026
		(−0.31)		(0.03)		(0.38)		(0.75)
Other variables	Included		Included		Included		Included	
$Adj.R^2$	0.1738	0.1804	0.1686	0.1780	0.2247	0.2278	0.2013	0.2123
N	734	734	734	734	734	734	734	734

Panel B: Caliper Distance = 0.03

	(1) $\lvert DiscretionaryAccruals\rvert_{OJONES i,t}$		(2) $\lvert DiscretionaryAccruals\rvert_{MJONES i,t}$		(3) $\lvert DiscretionaryAccruals\rvert_{CFOADJ i,t}$		(4) $\lvert DiscretionaryAccruals\rvert_{ROAADJ i,t}$	
	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE
$IFRSPOST_{i,t}$	0.0057		0.0072		0.0052		0.0077**	
	(1.30)		(1.54)		(1.47)		(2.21)	
$IFRSPOST\_SMALL_{i,t}$		0.0152*		0.0183**		0.0114**		0.0185**
		(1.92)		(2.26)		(2.23)		(2.52)
$IFRSPOST\_MEDIUM_{i,t}$		-0.0005		-0.0009		-0.0003		-0.0012
		(−0.11)		(−0.19)		(−0.05)		(−0.28)
$IFRSPOST\_LARGE_{i,t}$		-0.0011		0.0004		0.0025		0.0021
		(−0.26)		(0.10)		(0.66)		(0.65)
Other variables	Included		Included		Included		Included	
$Adj.R^2$	0.1822	0.1887	0.1761	0.1856	0.2367	0.2403	0.2056	0.2174
N	704	704	704	704	704	704	704	704

Panel C: Caliper Distance = 0.01

	(1) $\lvert DiscretionaryAccruals\rvert_{OJONES i,t}$		(2) $\lvert DiscretionaryAccruals\rvert_{MJONES i,t}$		(3) $\lvert DiscretionaryAccruals\rvert_{CFOADJ i,t}$		(4) $\lvert DiscretionaryAccruals\rvert_{ROAADJ i,t}$	
	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE	(a) BASE	(b) WHOLE
$IFRSPOST_{i,t}$	0.0104**		0.0118**		0.0083**		0.0095**	
	(2.15)		(2.26)		(2.04)		(2.36)	
$IFRSPOST\_SMALL_{i,t}$		0.0181*		0.0213**		0.0130**		0.0206**
		(1.93)		(2.25)		(2.38)		(2.51)
$IFRSPOST\_MEDIUM_{i,t}$		0.0029		0.0024		0.0033		-0.0018
		(0.46)		(0.38)		(0.48)		(−0.33)
$IFRSPOST\_LARGE_{i,t}$		0.0078		0.0085*		0.0071		0.0064*
		(1.62)		(1.77)		(1.51)		(1.86)
Other variables	Included		Included		Included		Included	
$Adj.R^2$	0.1705	0.1740	0.1664	0.1731	0.2254	0.2264	0.1946	0.2077
N	620	620	620	620	620	620	620	620

Note: This table reports the robustness tests results on imposing a caliper distance to 0.10, 0.03, and 0.01. The equations and definitions of variables are as follows:
$\lvert DiscretionaryAccruals\rvert_{i,t} = \theta_0 + \theta_1 IFRSPOST_{i,t} + Controls + \varepsilon_{i,t}$ (a);
$\lvert DiscretionaryAccruals\rvert_{i,t} = \theta_0 + \theta_1 IFRSPOST\_SMALL_{i,t} + \theta_2 IFRSPOST\_MEDIUM_{i,t} + \theta_3 IFRSPOST\_LARGE_{i,t} + Controls + \varepsilon_{i,t}$ (b).
$\lvert DiscretionaryAccruals\rvert_{i,t}$ = absolute value of firm *i*'s cross-sectional discretionary accruals calculated in accordance with Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005); $IFRSPOST_{i,t}$ = dummy variable indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (*t*–3 to *t*–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; *Controls* = other variables included in Eq. (4). Subscripts *i* and *t* represent firm and year, respectively. ***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009).

Table 14
Additional Analysis Results for Earnings Quality Tests.

	(1) $\lvert DiscretionaryAccruals\rvert_{OJONES_{i,t}}$		(2) $\lvert DiscretionaryAccruals\rvert_{MJONES_{i,t}}$		(3) $\lvert DiscretionaryAccruals\rvert_{CFOADJ_{i,t}}$		(4) $\lvert DiscretionaryAccruals\rvert_{ROAADJ_{i,t}}$	
	coefficient	*t*-statistic	coefficient	*t*-statistic	coefficient	*t*-statistic	coefficient	*t*-statistic
Number of analysts—reporting incentive								
$IFRSPOST\_SMALL_{i,t}$	0.0091	1.50	0.0116	1.80*	0.0045	0.90	0.0137	3.01***
$IFRSPOST\_MEDIUM_{i,t}$	0.0043	1.13	0.0036	0.97	0.0041	0.91	0.0013	0.37
$IFRSPOST\_LARGE_{i,t}$	0.0050	1.14	0.0057	1.32	0.0064	1.77*	0.0041	1.47
Foreign Ownership—reporting incentive								
$IFRSPOST\_SMALL_{i,t}$	0.0061	0.93	0.0076	1.23	0.0057	1.26	0.0079	1.92*
$IFRSPOST\_MEDIUM_{i,t}$	0.0102	2.69***	0.0105	2.13**	0.0052	1.21	0.0096	2.25**
$IFRSPOST\_LARGE_{i,t}$	0.0017	0.42	0.0020	0.53	0.0038	0.94	0.0007	0.20
Big 4 auditor—reporting incentive								
$IFRSPOST\_SMALL_{i,t}$	0.0353	2.03**	0.0364	2.16**	0.0223	1.73*	0.0333	2.43**
$IFRSPOST\_MEDIUM_{i,t}$	-0.0075	-0.64	-0.0059	-0.71	-0.0004	-0.04	0.0043	0.54
$IFRSPOST\_LARGE_{i,t}$	0.0037	1.16	0.0044	1.24	0.0034	0.96	0.0034	1.09
Sales growth—reporting incentive								
$IFRSPOST\_SMALL_{i,t}$	0.0060	1.97*	0.0068	2.34**	0.0066	2.05**	0.0063	3.37***
$IFRSPOST\_MEDIUM_{i,t}$	0.0074	1.18	0.0075	1.11	0.0058	1.41	0.0036	0.61
$IFRSPOST\_LARGE_{i,t}$	0.0046	0.91	0.0060	1.12	0.0021	0.45	0.0086	2.19**
Goodwill/TotalAssets—accounting verifiability								
$IFRSPOST\_SMALL_{i,t}$	0.0003	0.07	0.0007	0.21	0.0007	0.24	0.0028	1.02
$IFRSPOST\_MEDIUM_{i,t}$	0.0026	0.66	0.0034	0.88	0.0030	0.68	0.0005	0.14
$IFRSPOST\_LARGE_{i,t}$	0.0176	1.97*	0.0185	2.04**	0.0125	2.21**	0.0171	2.65***
R&D/Sales—accounting verifiability								
$IFRSPOST\_SMALL_{i,t}$	0.0164	2.11**	0.0170	2.11**	0.0107	2.24**	0.0135	1.93*
$IFRSPOST\_MEDIUM_{i,t}$	-0.0025	-0.56	-0.0019	-0.38	-0.0010	-0.26	-0.0024	-0.61
$IFRSPOST\_LARGE_{i,t}$	0.0053	2.33**	0.0061	3.18***	0.0057	2.11**	0.0080	3.33***
Firm age (listing)—accounting resource								
$IFRSPOST\_SMALL_{i,t}$	0.0198	2.13**	0.0210	2.10**	0.0132	2.14**	0.0169	1.86*
$IFRSPOST\_MEDIUM_{i,t}$	0.0022	0.39	0.0023	0.45	0.0019	0.37	0.0027	0.61
$IFRSPOST\_LARGE_{i,t}$	-0.0023	-0.59	-0.0014	-0.38	0.0007	0.20	-0.0001	-0.04
Total assets (yen)—accounting resource								
$IFRSPOST\_SMALL_{i,t}$	0.0172	2.17**	0.0190	2.25**	0.0111	2.31**	0.0167	2.25**
$IFRSPOST\_MEDIUM_{i,t}$	0.0032	0.74	0.0030	0.68	0.0026	0.55	0.0033	0.73
$IFRSPOST\_LARGE_{i,t}$	-0.0003	-0.06	0.0008	0.17	0.0028	0.86	0.0009	0.22
Number of employees—accounting resource								
$IFRSPOST\_SMALL_{i,t}$	0.0153	3.66***	0.0177	3.96***	0.0134	4.12***	0.0146	3.94***
$IFRSPOST\_MEDIUM_{i,t}$	0.0026	0.71	0.0012	0.34	0.0025	0.63	-0.0009	-0.35
$IFRSPOST\_LARGE_{i,t}$	0.0004	0.08	0.0017	0.36	-0.0011	-0.38	0.0049	1.07

Note: This table reports the additional analysis results of effects of reporting incentives, accounting verifiability, and accounting resources on earnings quality. The equations and definitions of variables are as follows:

$$\lvert DiscretionaryAccruals\rvert_{i,t} = \theta_0 + \theta_1 IFRSPOST\_SMALL_{i,t} + \theta_2 IFRSPOST\_MEDIUM_{i,t} + \theta_3 IFRSPOST\_LARGE_{i,t} + Controls + \varepsilon_{i,t}$$

We classify the variables shown in Table 6 into three categories: reporting incentives, accounting verifiability, and accounting resources. All characteristics are measured as the mean value of the three years before IFRS adoption (*t*–3 to *t*–1). Number of analysts = number of analysts following the firm; Foreign Ownership = ratio of foreign shareholdings to total shareholdings at the end of the fiscal year; Big 4 auditor = dummy variable indicating whether the firm is audited by a Big 4 firm; Sales growth = annual percentage change in sales; Goodwill/Total assets = ratio of goodwill to total assets at the end of the fiscal year; R&D/Sales = ratio of R&D expenses to total sales; Firm age (listing) = number of years from the year of listing on a stock exchange to the current year; Total assets (yen) = total assets measured in Japanese yen; Number of employees = number of firm employees. Based on each variable, we reclassified our testing variables and regressed the above equation. $\lvert DiscretionaryAccruals\rvert_{i,t}$ = absolute value of firm *i*'s cross-sectional discretionary accruals calculated in accordance with Jones (1991), Dechow et al. (1995), Kasznik (1999), and Kothari et al. (2005); $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (*t*–3 to *t*–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; *Controls* = other variables included in Eq. (4). Subscripts *i* and *t* represent firm and year, respectively. ***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009). In each regression, we included each partitioning variable as additional control variable.

our results remain qualitatively unchanged and robust to changing the bid-ask spread measurement period.

Second, Tables 12 and 13 present the results of imposing a caliper distance. Imposing a caliper distance restricts the maximum distance between propensity scores allowable for a successful match (Shipman et al., 2017). Based on Shipman et al. (2017), we impose caliper distances of 0.10, 0.03, and 0.01 and re-estimate our main results for Hypotheses 1_0, 2, and 3. As shown in Panels A, B, and C of Table 12 ($H1_0$ and 2) and 13 (H3), our results remain qualitatively unchanged. Therefore, we conclude that our main results are robust to imposing caliper distances.

Finally, we use different definitions for firm size classification. Specifically, we define "small" firms as those with market capitalization of less than 50 billion or 100 billion yen and include other "small" firms in the "medium" firm group. We obtain similar inferences for "small" firms (untabulated).

Table 15
Additional Analysis Results for Information Asymmetry Test.

			WHOLE	
			coefficient	*t*-statistic
Reporting incentives	Number of analysts	$IFRSPOST\_SMALL_{i,t}$	0.1137	1.85*
		$IFRSPOST\_MEDIUM_{i,t}$	0.0602	0.94
		$IFRSPOST\_LARGE_{i,t}$	0.0423	0.45
	Foreign Ownership	$IFRSPOST\_SMALL_{i,t}$	0.0736	1.07
		$IFRSPOST\_MEDIUM_{i,t}$	-0.0009	-0.02
		$IFRSPOST\_LARGE_{i,t}$	0.1485	1.66*
	Big 4 auditor	$IFRSPOST\_SMALL_{i,t}$	-0.0478	-0.49
		$IFRSPOST\_MEDIUM_{i,t}$	0.8511	2.46**
		$IFRSPOST\_LARGE_{i,t}$	0.0464	1.45
	Sales growth	$IFRSPOST\_SMALL_{i,t}$	0.1994	2.55**
		$IFRSPOST\_MEDIUM_{i,t}$	0.0007	0.01
		$IFRSPOST\_LARGE_{i,t}$	0.0294	0.48
Accounting verifiability	Goodwill/TotalAssets	$IFRSPOST\_SMALL_{i,t}$	0.0820	1.23
		$IFRSPOST\_MEDIUM_{i,t}$	0.1863	2.14**
		$IFRSPOST\_LARGE_{i,t}$	-0.0791	-1.05
	R&D/Sales	$IFRSPOST\_SMALL_{i,t}$	0.0603	1.03
		$IFRSPOST\_MEDIUM_{i,t}$	0.0757	1.16
		$IFRSPOST\_LARGE_{i,t}$	0.0795	0.74
Accounting resources	Firm age (listing)	$IFRSPOST\_SMALL_{i,t}$	0.1123	1.93*
		$IFRSPOST\_MEDIUM_{i,t}$	0.0654	1.12
		$IFRSPOST\_LARGE_{i,t}$	0.0308	0.38
	Total assets (yen)	$IFRSPOST\_SMALL_{i,t}$	0.1443	1.76*
		$IFRSPOST\_MEDIUM_{i,t}$	0.0356	0.71
		$IFRSPOST\_LARGE_{i,t}$	0.0642	0.61
	Number of employees	$IFRSPOST\_SMALL_{i,t}$	0.1830	2.15**
		$IFRSPOST\_MEDIUM_{i,t}$	0.0367	0.84
		$IFRSPOST\_LARGE_{i,t}$	-0.0024	-0.03

Note: This table reports the additional analysis results of effects of reporting incentives, accounting verifiability, and accounting resources on information asymmetry:
$Log(Bid\text{-}Ask\ Spread)_{i,t} = \gamma_0 + \gamma_1 IFRSPOST\_SMALL_{i,t} + \gamma_2 IFRSPOST\_MEDIUM_{i,t} + \gamma_3 IFRSPOST\_LARGE_{i,t} + Controls + \varepsilon_{i,t}$
We classify the variables shown in Table 6 into three categories: reporting incentives, accounting verifiability, and accounting resources. All characteristics are measured as the mean value of the three years before IFRS adoption (*t*–3 to *t*–1). Number of analysts = number of analysts following the firm; Foreign Ownership = ratio of foreign shareholdings to total shareholdings at the end of the fiscal year; Big 4 auditor = dummy variable indicating whether the firm is audited by a Big 4 firm; Sales growth = annual percentage change in sales; Goodwill/Total assets = ratio of goodwill to total assets at the end of fiscal year; R&D/Sales = ratio of R&D expenses to total sales; Firm age (listing) = number of years from the year of listing on a stock exchange to the current year; Total assets (yen) = total assets measured in Japanese yen; Number of employees = number of firm employees. Based on each variable, we reclassified our testing variables and regressed the above equation. $Log(Bid\text{-}Ask\ Spread)_{i,t}$ = natural logarithm of the average relative daily spread (i.e., daily best ask price minus daily best bid price divided by the average of bid and ask) for three months after a firm's fiscal year-end; $IFRSPOST\_SMALL_{i,t}$, $IFRSPOST\_MEDIUM_{i,t}$, and $IFRSPOST\_LARGE_{i,t}$ = dummy variables indicating observations where consolidated financial statements are prepared and reported in accordance with IFRS for firms whose average of $Log(Size\_Mcap)_{i,t}$ for 3 years before adopting IFRS (*t*–3 to *t*–1) belongs to the first tertile ($IFRSPOST\_SMALL_{i,t}$), second tertile ($IFRSPOST\_MEDIUM_{i,t}$), and third tertile ($IFRSPOST\_LARGE_{i,t}$), respectively; *Controls* = other variables included in Eqs. (2) and (3). Subscripts *i* and *t* represent firm and year, respectively. ***, **, and * indicate two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively. *t*-statistics are calculated based on robust standard errors clustered by both firm and year following Petersen (2009). In each regression, we included each partitioning variable as an additional control.

5. Additional analyses

In the main analyses, we employ firm size as a proxy for reporting incentives and accounting resources. In this section, we conduct exploratory analyses of factors that affect information asymmetry and earnings quality after voluntary IFRS adoption. Table 6 shows some firm characteristic differences between small and large firms. We classify these factors into three categories: reporting incentives, accounting verifiability, and accounting resources. Reporting incentives are related to earnings management incentives and include the number of analysts, foreign ownership, Big 4 auditors, and sales growth. Security analysts, foreign institutional investors, and Big 4 auditors are expected to be more likely to prevent managers from engaging in earnings management. Low accounting verifiability may decrease earnings quality because it is difficult for outsiders like auditors to verify managers' accounting choices. Because some differences between J-GAAP and IFRS remain, we investigate goodwill and R&D accounts. Accounting resources are expected to positively affect earnings quality, and small- and medium-sized firms have fewer accounting resources than large firms. Our proxies for accounting resources are firm age, total assets, and number of employees. Pearson's correlations between firm size (market capitalization) and these factors are 0.8637 for number of analysts, 0.6165 for foreign ownership, 0.3626 for Big 4 auditor, –0.2618 for sales growth, 0.0351 for goodwill, 0.2492 for R&D, 0.5173 for firm age, 0.8822 for total assets, and 0.7377 for number of employees (untabulated). We divide our observations into "small," "medium," and "large" firms based on each factor's average value for the three years before voluntary IFRS adoption.

Tables 14 and 15 present the results for the earnings quality and information asymmetry tests, respectively. In Column (4) of Table 14, ROA-adjusted discretionary accruals (absolute value) increase after voluntary IFRS adoption for firms with few analysts, smaller foreign investors, non-Big 4 auditors, high sales growth, young age, small total assets, and few employees, consistent with the reporting incentive and accounting resource explanations. Although the results are consistent with the accounting verifiability explanation, small- and medium-sized firms have smaller goodwill and R&D expenditure amounts. Thus, because the relationship between firm size and accounting verifiability is unclear, the results should be interpreted cautiously. In Columns (1) to (3), the results are similar to those in Column (4), except for sales growth. In addition, the results for sales growth should be interpreted carefully because they indicate that low-growth firms experience a decrease in earnings quality after voluntary IFRS adoption. This may reflect that low-growth firms engage in earnings management to meet or beat earnings targets such as prior-year earnings and losses.

In Table 15, the results for the number of analysts indicate that firms with smaller analyst followings experience an increase in information asymmetry after voluntary IFRS adoption, consistent with our prediction. However, the results for other reporting incentives are inconsistent with our predictions. Since most voluntary IFRS adopters hire Big 4 audit firms before or just before IFRS adoption,[19] the results for Big 4 auditors may be biased and should be carefully interpreted. The results of accounting verifiability are not consistent with those of the earnings quality tests. Thus, although changes in accounting verifiability affect earnings quality, their effect on information asymmetry is unclear. The results of accounting resources are consistent with those for the earnings quality tests and our prediction that firms with fewer accounting resources experience decreases in earnings quality and, hence, increased information asymmetry.

Overall, the additional analyses provide evidence supporting the reporting incentive and accounting resource explanations for earnings quality. For information asymmetry tests, the accounting resource explanation is supported by all aspects of firm resources, whereas the reporting incentive explanation is supported by the number of analysts but not the other three aspects. These results are important in two respects. First, they provide some explanation for why small- and medium-sized firms experience decreases in earnings quality and increases in information asymmetry after voluntary IFRS adoption. Second, because there are several paths, firm size can be an aggregated proxy for the reporting environment, including reporting incentives and accounting resources.

6. Conclusions

Prior research suggests that voluntary IFRS adoption positively affects information asymmetry in stock markets when local accounting standards significantly differ from IFRS and is viewed as a commitment to transparent financial reporting. However, other research obtains inconsistent results for voluntary IFRS adoption effects on information asymmetry in countries with small accounting differences between local standards and IFRS. We looked closer at Japan, where local accounting standards have been converged to IFRS but have a different implementation approach (i.e., small accounting rule differences but large implementation approach differences). We investigated the effect of voluntary IFRS adoption on the stock market (i.e., changes in information asymmetry in the stock market proxied by bid-ask spread) as well as its potential reason (i.e., changes in earnings quality proxied by the absolute value of discretionary accruals). We also examined whether this effect varies according to firm size, which represents firms' reporting incentives and accounting resources. Our study's findings and incremental contributions to the literature are as follows.

First, we find an increase in the bid-ask spread after voluntary IFRS adoption. This result suggests that, on average, voluntary IFRS adoption worsens information asymmetry in Japan's stock markets. Second, we observe deterioration in bid-ask spread only for small- and medium-sized voluntary adopters. Third, we examine changes in IFRS adopters' earnings quality before and after IFRS adoption to explore a reason for the increased bid-ask spread. We find that small- and medium-sized firms report larger discretionary accruals after voluntary IFRS adoption. These results suggest that the increase in information asymmetry in the stock market results, at least partially, from the decreased earnings quality of small- and medium-sized firms after voluntary IFRS adoption. Finally, we provide some evidence suggesting that firms' reporting incentives and limited accounting resources deteriorate earnings quality and information asymmetry at the time of voluntary IFRS adoption.

This study contributes to the literature at least in two ways. First, the results contribute to prior research on the effects of voluntary IFRS adoption by looking more closely at a situation where local accounting standards and IFRS are converged but differ in accounting approaches (i.e., rules- vs. principles-based). Our finding suggests that voluntary IFRS adoption has an adverse effect on information asymmetry in stock markets, especially for small- and medium-sized firms. Moreover, this study corroborates prior research findings that document the negative effects of mandatory IFRS adoption on earnings quality by investigating a single country and examining firm size effects. Second, this study contributes to prior research on small- and medium-sized firms' accounting choices under IFRS by focusing on the consequences of voluntary IFRS adoption and showing that information asymmetry increases for such firms after voluntary IFRS adoption. Finally, our findings are of interest to policymakers and the IASB as we show that small- and medium-sized firms decrease earnings quality, thus increasing information asymmetry after voluntary adoption.

Despite these important contributions, this study has some limitations. First, there is the possibility of correlated omitted variable bias. Although we construct a first-stage probit regression model using the characteristics of IFRS adopters that have been identified in prior studies, other variables unique to Japanese firms could also exist. If those variables were correlated with information asymmetries, then our results could be biased, suggesting they should be interpreted cautiously. Thus, future research might develop first-stage probit regression models that explain IFRS adopters' characteristics by including variables unique to Japanese firms.

[19] Only 6 out of 70 IFRS adopters continuously hire non–Big 4 audit firms three years before their IFRS adoption.

Furthermore, since our inferences are based on only 70 IFRS adopters, the generalizability of our results could be questioned. As the number of IFRS adopters in Japan is increasing, future research could mitigate this problem.

Author statement

We thereby confirm our equal contribution to all the steps for the preparation of this paper.

CRediT authorship contribution statement

Yuya KOGA: Writing – original draft, Writing – review & editing, Conceptualization, Investigation, Methodology. **Keishi FUJIYAMA:** Writing – original draft, Writing – review & editing, Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Resources. **Jong-Hoon KIM:** Writing – original draft, Writing – review & editing, Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Resources.

Declaration of Competing Interest

None.

Data availability

The authors do not have permission to share data.

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Appendix A. Differences in accounting approach (principles- vs. rules-based)

The differences in accounting approach	IFRS	J-GAAP
Balance sheet: presented items	Relatively limited items are separately presented in the balance sheet.	The Ordinance on Terminology, Forms, and Preparation Methods of Consolidated Financial Statements requires details of items presented in the balance sheet.
Income statement: presented items	Relatively limited items are separately presented in the income statement.	The Ordinance on Terminology, Forms, and Preparation Methods of Consolidated Financial Statements requires details of items presented in the income statement.
Revenue recognition: exception	There is no specific accounting rule.	Some alternative accounting treatments to alleviate application costs are allowed. For example, the company can choose not to identify less important performance obligations.
Inventory: Inclusion of borrowing costs in acquisition cost	Including borrowing costs in acquisition costs of inventories is required if they are qualifying assets.	There is no specific accounting rule. In some cases, including borrowing costs in acquisition costs of inventories is exceptionally required.
Property, plant, and equipment: Inclusion of borrowing costs in acquisition cost	Including borrowing costs in acquisition costs of property, plant, and equipment is required if they are qualifying assets.	Including borrowing costs in acquisition costs is exceptionally required for self-constructed fixed assets.
Lessee's accounting for leases: accounting treatment	Generally, all leases are on-balanced in financial statements.	Lease transactions are classified into finance leases and operating leases. Finance leases are on-balanced, whereas operating leases are off-balanced. There is detailed guidance for classifying finance leases and operating leases.
Lessee's accounting for leases: exceptional accounting treatment	Exceptionally, leases whose underlying asset is of low value (not specified, but it is under 5000 U.S. dollars according to the basis of conclusion) or short term (within 1 year) are not on-balanced.	Exceptionally, leases whose underlying asset is of low value (under 3 million yen) or short term (within 1 year) are not on-balanced.
Employee benefits: discount rate	The discount rate is determined based on yields of bonds with high creditworthiness as of the end of the fiscal year.	The discount rate is determined based on yields of long-term bond with high creditworthiness as of the end of the fiscal year. Exceptionally, if the change in the discount rate does not significantly change the value of the retirement benefit obligation (within 10 %), it is possible to continue to use the discount rate employed at the end of the previous fiscal year.

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The differences in accounting approach	IFRS	J-GAAP
Financial instrument: simple accounting treatment for hedging	Simple accounting treatment is not allowed.	Some exceptional and simple accounting treatments are allowed, such as the allocation treatment of foreign-exchange reserves and exceptional treatment of interest rate swaps.
Recoverability of deferred tax assets	There is only a principle and no guidance.	There is detailed guidance, such as scheduling the timing of eliminating temporary differences and company classification based on past performance.
Consolidated financial statements: consolidation criteria	Subsidiaries are determined based on the presence of control of an investee.	There is detailed guidance, including formal conditions regarding determining subsidiaries.
Consolidated financial statements: consolidation criteria	All subsidiaries are consolidated in financial statements without exception.	Subsidiaries whose control is temporary or where consolidated financial reporting could significantly mislead stakeholders are not consolidated in financial statements.
Investments in associates	Associate companies are determined by the presence of significant influence.	There is detailed guidance, including formal conditions regarding determining associate companies.

Source: Authors have reclassified Hashimoto and Yamada's (2018) classification and translated the Japanese sentences.

Appendix B. Differences in accounting procedures that potentially affect accounting accruals

The differences in accounting procedures	IFRS	J-GAAP
Revenue recognition: contract costs and costs to fulfill a contract	Accounting standards require companies to recognize contract costs and costs to fulfill a contract that meet certain criteria, and amortizing them on a systematic basis that is consistent with the transfer to the customer of the goods or services to which the asset relates.	There is no specific accounting rule.
Government grants	There are specific accounting treatments for government grants related to assets and to income.	While there is a specific accounting treatment for government grants related to assets, there is no specific accounting treatment for government grants related to income.
Inventory: inclusion of borrowing costs in acquisition costs	Including borrowing costs in acquisition costs of inventories is required if they are qualifying assets.	There is no specific accounting rule. In some cases, including borrowing costs in acquisition costs of inventories is exceptionally required.
Inventory: measurement of inventories	The amount of the write-down can be reversed (reversal method).	Companies can choose between two accounting treatments: reversal or non-reversal.
Property, plant, and equipment: measurement after recognition	Companies can choose either the cost or revaluation model.	The revaluation model is not allowed.
Property, plant, and equipment: review of the depreciation method	An asset's depreciation method should be reviewed at least at each fiscal year-end.	There is no specific accounting rule.
Property, plant, and equipment: review of the depreciation method	Each part of an item of property, plant, and equipment with a cost that is significant in relation to the total cost of the item should be depreciated separately.	There is no specific accounting rule.
Investment property	Companies can choose either the cost or fair value model.	The fair value model is not allowed. The fair value of investment property is disclosed in footnotes.
Intangibles: development costs	Expenditures for development that meet several criteria shall be recognized.	Expenditures for development should be treated as expenses.
Intangibles: measurement after recognition	Companies can choose either the cost or revaluation model.	The revaluation model is not allowed.
Intangibles: amortization	Amortization of intangibles is determined based on their useful life. Intangibles with finite useful lives are amortized, whereas those with indefinite useful lives are not.	There is no specific accounting treatment based on intangibles' useful lives. Annual impairment testing is not always required, even for non-amortized intangibles.
Non-current assets held for sale: depreciation	Depreciation of non-current assets held for sale is not allowed.	Depreciation of non-current assets held for sale is allowed if they are depreciable assets.
Provisions: recognition	Provisions are recognized if companies have a present obligation (legal or constructive) as a result of a past event.	Provisions can be recognized even if companies do not have a present obligation.
Employee benefits: paid annual leave	Companies shall recognize the expected cost of short-term employee benefits in the form of paid absences.	There is no specific accounting treatment.
Employee benefits: attribution method	Companies shall attribute benefit to periods of service under the plan's benefit formula. However, in a case where employees' service in later years leads to a materially higher level of benefit than in earlier years, a company can choose to attribute benefit on a straight-line basis.	Companies can choose either the attribution method under the plan's benefit formula or the straight-line basis. However, in a case where employees' service in later years leads to a materially higher level of benefit than in earlier years, a company can choose to attribute benefit on a straight-line basis.

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The differences in accounting procedures	IFRS	J-GAAP
Employee benefits: discount rate	The discount rate is determined based on the yields of bonds with high creditworthiness as of the end of the fiscal year.	The discount rate is determined based on the yields of long-term bond with high creditworthiness as of the end of the fiscal year. Exceptionally, if the change in the discount rate does not significantly change the retirement benefit obligation's value (within 10 %), it is possible to continue to use the discount rate employed at the end of the previous fiscal year.
Employee benefits: components of defined benefit costs in income statement	(a) Service cost; (b) net interest on the net defined benefit liability (asset)	(a) Expected return on the defined benefit assets; (b) interest expense on the defined benefit liability; (c) re-recognized (recycled) actuarial gain or loss; (d) re-recognized (recycled) service cost
Employee benefits: interest expense	Companies shall determine net interest on the net defined benefit liability by multiplying the net defined benefit liability by the discount rate.	Companies should determine interest on the defined total benefit liability by multiplying the total defined benefit liability by the discount rate.
Employee benefits: expected return	Expected return on assets is not measured.	Companies should determine expected return by multiplying the total defined benefit assets by the long-term expected return rate.
Employee benefits: actuarial gains and losses	Actuarial gains and losses shall be recognized in other comprehensive income (non-recycling).	Actuarial gains or losses should be recognized in other comprehensive income. The amount apportioned over a certain number of years within the employees' average remaining service period is re-recognized in net income (recycling).
Employee benefits: past service costs	Past service costs shall be recognized in net income	Past service costs should be recognized in other comprehensive income. The amount apportioned over a certain number of years within the employees' average remaining service period is re-recognized in net income (recycling).
Employee benefits: termination benefits	Companies shall recognize a liability and expense for termination benefits at the earlier of the following dates: when the company can no longer withdraw the offer of those benefits; and when the entity recognizes costs for a restructuring that is within the scope of IAS 37 and involves payment of termination benefits.	The termination benefits (early retirement allowance) are recognized as an expense when the employee applies for the early retirement program and the amount is reasonably estimated.
Share-based payment: cash-settled payment	Companies shall measure goods or services acquired and the liability incurred at fair value. Until the liability is settled, the company shall remeasure the fair value of the liability.	There is no specific treatment.
Share-based payment: after vesting date	Companies shall not make any subsequent adjustment to total equity after vesting date.	Companies shall subsequently reverse the amount recognized in the income statement for services received from an employee when the vested stock options are not exercised.
Financial instruments: measurement of an unlisted stock	Unlisted stocks are measured at fair value.	Unlisted stocks are measured at acquisition (historical) cost.
Financial instruments: equity instruments held for non-trading purposes	A financial instrument shall be measured at fair value through the income statement or other comprehensive income. If companies decide to measure it through other comprehensive income, re-recognizing in net income (recycling) is not allowed.	A financial instrument should be measured at fair value through other comprehensive income, and the profit or loss is re-recognized in the income statement if they are sold.
Loan loss provisions	A company shall measure the loss allowance for a financial instrument if the credit risk on that financial instrument has increased significantly since initial recognition.	The amount of loan loss provision is determined by loan classification according to credit risk.
Reversing an impairment loss	An impairment loss recognized for an asset other than goodwill shall be reversed if there has been a change in the estimates.	Generally, an impairment loss recognized for an asset should not be reversed even if there has been a change in the estimates.
Bond issue expenses	Bond issue expenses are netted against the carrying amount of the bonds.	Bond issue expenses are expensed in the period when the debt is issued or accumulated in a deferred charge account and amortized.
Stock issue expenses	Stock issue expenses are netted against the amount of the equity.	Stock issue expenses are expensed in the period when the stock is issued or accumulated in a deferred charge account and amortized.
Income taxes: tax rates for estimating tax effects on unrealized gain	There is no specific requirement, but tax effects on unrealized gains are calculated using the buyer's tax rates.	Tax effects on unrealized gains eliminated in the consolidation procedure are calculated using the seller's tax rates.
Business combinations: recognition of contingent liabilities	The acquirer shall recognize as of the acquisition date a contingent liability assumed in a business combination if it is a present obligation that arises from past events and its fair value can be measured reliably, contrary to IAS 37 (*Provisions, Contingent Liabilities and Contingent Asset*).	There is no exceptional accounting treatment.

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The differences in accounting procedures	IFRS	J-GAAP
Business combinations: provision incurred from business combination	A provision incurred from a business combination is not to be recognized as a liability if companies have a present obligation (legal or constructive) with respect to it.	A provision incurred from a business combination is recognized as a liability if the cost or loss is expected to be incurred after the acquisition and the possibility of these costs and loss is reflected in the acquisition costs.
Business combinations: amortization of goodwill	Amortization of goodwill is not allowed.	Companies can amortize goodwill regularly within 20 years.
Foreign exchange: functional currency	A company determines the functional currency as the currency of the primary economic environment in which it operates. The company is required to exchange the entity's financial statement items in functional currency.	There is no specific concept of functional currency.
Foreign exchange: items of profit or loss	A foreign currency transaction shall be recorded by applying the spot exchange rate on the date of the transaction. For practical reasons, applying the average rate for a week or month is allowed.	A foreign currency transaction related to profit or loss items shall be recorded by applying the average rate or spot exchange rate at the date of the transaction.

Source: Authors have reclassified Hashimoto and Yamada's (2018) classification and translated Japanese sentences.

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