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Business Risk Disclosure and Firm Risk: Evidence from Japan

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Highlights

- The introduction of mandatory business risk disclosure has a negative impact on total risk.
- The mandatory business risk disclosure is positively related with total risk across firms and years after the inception.
- The effect of reducing the cost of capital exceed the effects on increasing investors' assessment of firm risk.

Abstract

We take advantage of the introduction phase of business risk disclosure in Japan as a natural experiment to examine the causal effects on firm risk. In contrast to risk factor disclosure that appeared partly in the Management Discussion and Analysis section (MD&A) in the United States, Japanese business risk disclosure is a new, independent disclosure regime, which began in the fiscal year ending March 2004.We find that the introduction of mandatory business risk disclosure has a negative impact on total risk. This suggests that an increase in business risk disclosure contributes to reduce a firm's cost of capital, which is contrary to the results found in previous research. However, we also find that there is a positive relationship across firms and years after the inception between the amount of business risk disclosure and total risk, indicating that mandatory business risk disclosure has an impact on increasing investors' assessment of firm risk.

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Although the two effects offset each other, the effects of enhanced disclosure of business risks on reducing the cost of capital exceed the effects on increasing investors' assessment of firm risk.

JEL classification: G14 M41

Keywords: Mandatory business risk disclosure; narrative risk disclosure; Total risk; Cost of capital

1. Introduction

We empirically examine the economic effects of textual disclosure focusing on mandatory business risk disclosure. We focus on the introduction phase of business risk disclosure in Japan to capture the e*xogenous* variation in the supply of public information to identify whether mandatory business risk disclosure increases or decreases investors' assessment of firm risk. Business risk disclosure in Japan is intended to enable investors to assess a firm's business risk (FSA, 2003), and it is equivalent to the risk factors disclosure included in the 10-K filings in the United States. However, it is noteworthy that business risks appeared partly in the Management Discussion and Analysis section (MD&A) in the United States before the introduction of risk factors disclosures (e.g., comments letter 9 on proposed rules, SEC 1999). In contrast, Japanese business risk disclosure is a new, independent disclosure regime, which began in the fiscal year ending March 2004. Thus, we take advantage of the

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introduction of business risk disclosure in Japan as a natural experiment to examine the causal effects of mandatory business risk disclosure on firm risk.

There is an additional benefit from focusing on the *new* business risk disclosure rule in Japan. Because there was little information about the content, format, and writing style accompanying the introduction of the new regulations, it would seem unreasonable to expect that managers would only disclose boilerplate information or industry-wide or macroeconomic risk factors in their mandatory business risk disclosure, at least initially. In this sense, we would expect more accurate experiment about the effects of business risk disclosures by focusing on the introduction phase in Japan.

Business risk disclosure can increase the amount of information that is related to a firm's risk, but it is unclear whether this information decreases or increases the information component of the cost of capital, because textual business risk disclosure is unique in the sense that it addresses negative factors that could potentially affect a firm's future performance. A growing body of literature has empirically examined the economic effects of business risk disclosure by investigating the relationship between the disclosure level and/or the information content of business risk disclosure and the cost of capital (Kravet and Muslu, 2013; Campbell et al., 2014). However, the main

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empirical challenge is that a discretionary aspect remains in business risk disclosure, even though it is mandatory, because business risk disclosure is textual in nature and all the information relates to "unfavorable" factors[1]. Thus, showing that disclosure affects the cost of capital, and by how much, is still a challenging topic.We find that the introduction of mandatory business risk disclosure has a negative impact on total risk. This suggests that an increase in business risk disclosure reduces a firm's cost of capital (e.g., Easley and O'Hara, 2004), which is contrary to the results of previous research (e.g., Campbell, et al., 2014). However, we also find that there is a positive relationship between the amount of business risk disclosure and the total risk under cross-sectional analysis after inception, indicating that business risk disclosure has an increasing impact on investors' assessment of firm risk (i.e., increasing the cost of capital). This result is consistent with previous empirical findings. Although the two effects offset each other, the effects of enhanced disclosure of business risks on reducing the cost of capital exceed the effects on increasing the cost of capital. Thus, the net effect of the introduction of mandatory business risk disclosure indicates a reduction in the cost of capital.

[1] Linsely and Shrives (2006) argue that the association between risk levels and risk disclosure levels can be positive or negative. Therefore, the usefulness of risk disclosure should be empirically examined.

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A unique feature of this study is, as we already mentioned, that we take advantage of the introductory phase of mandatory business risk disclosure in Japan to identify the causal effects of the disclosure. If we examine the business risk disclosure by using the data only after the inception, we might only capture the effects of the changes in business risk disclosures but potentially undervalue the level effects of the disclosures because stock prices promptly reflect risk information at the first lease of the introduction of mandatory business risk disclosure. Following Campbell et al. (2014), we also confirmed that the changes of business risk disclosures are informative and investors incorporate the information into their risk assessments and thus increase the information component within the cost of capital after the introduction of mandatory business risk disclosure. In this sense, our new results seem to be not due to sample-differences (i.e., Japan vs. U.S.).

Overall, the important contribution of this paper is the identification of the net economic effects of the introduction of mandatory business risk disclosure and isolation of the results from cross-section and time-series variations in business risk disclosure effects[2].

[2] In addition, we have attempted to contribute an international perspective to the growing body of textual business risk disclosure analyses. For example, Amran et al. (2009) analyze Malaysian annual

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The remainder of this paper is organized as follows. Section 2 discusses the related literature and develops testable hypotheses. Section 3 describes our identification strategy, and explains the data, research methodology, and variables used in our empirical study. Sections 4 and 5 present our empirical findings and robustness check, respectively. Section 6 provides concluding remarks.

2. Literature review and hypothesis development

2.1. Literature review

The business risk disclosure in the annual reports was introduced from March 2004 in Japan. Business risk disclosure is narrative in nature, and is included in the "Business Risk, etc." section of the firms' annual reports[3].

Note that Japanese business risk disclosure is a new and independent disclosure regime that commenced in the fiscal year ending March 2004. Meanwhile, IPO firms had been required to submit the equivalent of business risk disclosure in their IPO prospectus before the introduction of mandatory risk disclosure in annual reports. We

reports, Hassan (2009) examines UAE corporate risk disclosures, and Taylor et al. (2010) focus on Australian listed companies.

[3] For the background of the introduction of business risk disclosure in Japan, see Fukukawa and Kim (2017).

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will take advantage of this institutional feature in Japan to identify the causal effects of textual business risk disclosures in Section 5.1.

Although business risk disclosure is mandatory, it is also somewhat voluntary in nature, because the underlying risks relating to corporate activities vary among firms, and managers have some discretion regarding what and how much to disclose[4]. Solomon et al. (2000) argue that the term "risk" includes all types of risks, and thus the scope of business risk disclosure should include anything that might possibly influence an investor's decision. Thus, business risk disclosure is expected to include all factors that could potentially affect a firm's future performance.

There are two lines of literature regarding narrative risk disclosure: one investigates the informativeness of risk disclosure while the other focuses on the determinants of the disclosure. Among the previous studies on the informativeness of risk disclosure, Miihkinen (2013) found a negative association between the risk disclosure quality and the bid-ask spread, indicating that high-quality risk disclosure reduces information asymmetry. Based on the empirical results, Campbell et al. (2014)

[4] Business risk disclosure in Japan is similar to the mandatory risk factor disclosures in the U.S. (SEC, 2005) in that the regulation does not specify risk factors to be disclosed, whereas in some European countries, such as Germany and Finland, the regulation is more specific about risks that should be disclosed (Miihkinen 2012).

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argued that managers provide useful risk factor disclosure and investors incorporate this information into their estimation of market values. In addition, Kravet and Muslu (2013) found that risk disclosure is positively associated with stock return volatility and trading volume, arguing that risk disclosure includes information content. Elshandidy and Shrives (2016) found that the market reacts to the tone of risk disclosure implying the usefulness of the risk information. Furthermore, Hope et al. (2016) found that more specific risk disclosure lead investors to enhanced understanding of risk.

Regarding the determinants of narrative risk disclosure, prior studies have found that factors such as company size, market beta, book-to-market ratio, profitability, ownership structure, and the effectiveness of corporate governance, are associated with business risk disclosure (Linsley and Shrives 2006, Abraham and Cox 2007, Dobler et al. 2011, Miihkinen 2012, Campbell et al. 2014, Elshandidy and Neri 2015, Martikainen et al. 2015). However, the empirical evidence has been mixed, partly because the studies were undertaken in different institutional settings. Khlif and Hussainey (2016) conducted a meta-analysis regarding to the determinants of risk disclosure and found that the lack of homogeneity across sectors or countries might affect the mixed empirical results. Dobler et al. (2016) analyzed the link between cultural values and the level of risk disclosure and found that country- specific cultures affect the disclosure.

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Fukukawa and Kim (2017) revealed that the attributes of auditor such as expertise and tenure also affect the extent of business risk disclosure.

A unique feature of this study is that we focus on the introductory phase of mandatory business risk disclosure using the data only after the inception, we capture the change effects of business risk disclosures but thus might undervalue the level effects of the disclosures[5].

2.2. Hypothesis

Textual business risk disclosure is unique because all information relates to "unfavorable" conditions, and there is information risk relating to the uncertainty surrounding a firm's future performance. Thus, if business risk disclosure introduced unknown contingencies, investors would diverge in their predictions of future performance and thus increase the cost of capital, even though the information asymmetry between a firm and investors, or between informed and uninformed investors, decreases (Kravet and Muslu, 2013 call this as the divergence argument).

[5] Balakrishnan et al. (2014) empirically examine the effects of voluntary disclosure. Heizman et al. (2010) examine incentives for voluntary disclosure and argue the importance of materiality. Elshandidy et al. (2014) compare mandatory and voluntary risk reporting by using cross-country data from Germany, the United Kingdom, and the United States.

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Theory predict that the economic effect of disclosure of a firm's business risk indicates that an increase in disclosure reduces the firm's cost of capital (see Diamond and Verrecchia,1991) because of reduced information asymmetry between investors. Previous empirical studies generally indicate a negative association between the level of firm's disclosures and the cost of capital. For example, Easley and O'Hara (2004) and Kelly and Ljungqvist (2012) show that the more information a firm discloses, the more its cost of capital decreases. These results are interpreted as evidence of the usefulness of disclosure by firms (e.g., Leuz and Verrecchia, 2000; Botosan and Plumlee, 2002; Kothari et al., 2009; Campbell et al., 2014). If this were also true for the case of business risk disclosure, we would expect increased business risk disclosure to be negatively correlated with a firm's risk (Kravet and Muslu, 2013 interpret this as the convergence argument). Recent theoretical work by Heinle and Smith (2017) demonstrates that risk disclosure decreases the firm's cost of capital by reducing a variance uncertainty premium in stock price.

Overall, whether business risk disclosure conveys additional information to investors and how that information affects perceptions of risk are important empirical questions. In light of the above discussion, we state our null hypothesis as follows:

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H0: Increased business risk disclosure are not associated with firm risk.

3. Empirical approach

3.1 Methodology

In this section, we describe our identification strategy. We focus on the introduction of mandatory business risk disclosure to capture the exogenous change in the level of business risk disclosure[6]. We collect data on stock returns, numbers of business risks disclosed, and other control variables from March 2003 and March 2004. These are the fiscal years immediately before and after the introduction of mandatory business risk disclosure. We test the following model between these two years:

$$\Delta Risk_{i,t} = \alpha_0 + \alpha_1 \Delta N\_Risk_{i,t} + \alpha \cdot \Delta FC_{it} + \Delta \varepsilon_{i,t} \quad (1)$$

Where *Risk* is the risk measure calculated using daily stock returns. We use three estimation windows, each beginning 2 days after annual report filing and ending 11 days (*Risk* (+2, +11)), 61 days (*Risk* (+2, +61)), and 184 days (*Risk* (+2, +184)) after filing for each fiscal year without overlapping the event date of timely disclosures (i.e.,

[6] A similar approach is also used by Gul et al. (2011) in relation to a different topic.

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the Japanese stock market also requires listed companies to disclose their financial information prior to submitting their annual report)[7].

N_ Risk is the level of business risk disclosure in March 2004 and zero in March 2003 for each firm. We estimate the number of business risk items disclosed in the "Business Risk, etc." section of the annual report as a proxy for the level of business risk disclosure. We also use the natural log of number of Japanese characters (*ln_ words*) and the natural log of sentences (*ln_ sentences*) as a robustness check. Because unobservable firm characteristics are largely time-invariant across the 2-year period, time-invariant variables have been differentiated out in the equation. Note that the change in *N_ Risk* is a result of the introduction of mandatory disclosure. Thus, as long as firms have incentives to disclose all their risk factors, we can more precisely capture the effects of business risk disclosure on the cost of capital.

We include several control variables (i.e., *FC* vectors) that can affect a firm's risk. *Size* is the natural log of total assets as a proxy of firm size. Linsley and Shrives (2006) argue that risk disclosure levels reflect firm size more than firm risk. Thus, *Size*

[7] Japanese stock market regulations require listed companies to disclose their financial information prior to filing an annual report (Kessan Tanshin). Thus, the business risk disclosures represent new information at the time of annual report filing owing to the financial information being disclosed in the Kessan Tanshin before submitting the annual report. Therefore, the information is already reflected in stock prices at the time of annual report filing.

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is expected to be negatively associated with risk level. *Leverage* is total assets deflated by the book value of equity, and it is expected that there will be a positive association between the leverage ratio and the risk level. *Roa* is the ratio of business income to total assets as a proxy of profitability. *Growth* is defined as the sales growth from the previous year. Profitability and sales growth are generally expected to have a negative association with risk. We winsorize all the control variables used in the estimation at the top and bottom 1% levels.

Note that the estimation result in equation (1) is essentially the same as that in the panel with individual fixed effects. Thus, we estimate by using panel data techniques with individual fixed effects using the following equation:

$$Risk_{i,t} = \beta_0 + \beta_1 N\_Risk_{i,t} + \beta \cdot FC_{i,t} + \eta_i + \varepsilon_{i,t} \quad (2)$$

where η_i captures firm *i*'s time-invariant characteristics.

3.2 Sample and data

Our sample includes Japanese listed companies in fiscal years 2002 and 2003. Mandatory business risk disclosure began in fiscal year 2003 (i.e., the year ending in

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March 2004). We selected companies listed on the first section of the Tokyo Stock Exchange. We excluded those whose fiscal year did not end March so as to eliminate any possible differences arising from various year-ends. In addition, we excluded finance-related companies (i.e., those involved in banking, securities, insurance, and other financial businesses) because those industries are highly regulated, and substantial differences exist between them and other industries. Our final sample comprised 1,799 observations. We collected financial data from the NEEDS Financial QUEST. We obtained daily stock return data from the ASTRA manager database.

We hand-collected business risk variables from the text found in the "Business Risk, etc." section of annual reports. Prior studies using textual information calculate the number of words, keywords, sentences, or their conjugated form as a proxy for qualitative information. For example, Li (2006) and Nelson and Pritchard (2007) count the number of risk-related keywords. Abraham and Cox (2007) use both the number of risk-related keywords and the number of risk-related sentences in annual reports. Kravet and Muslu (2013) calculate the change in the total number of sentences with at least one risk-related keyword in 10-K filings. Campbell et al. (2014) investigates the informativeness of business risk disclosure by focusing only on the "Risk Factors"

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section in 10-K, which is the counterpart of "Business Risk, etc." in Japan. Campbell et al. (2014) counts the number of keywords related to their unique risk categories.

To examine the effects of business risk disclosure contents on a firm's risk, we categorize the contents of business risk items[8]. With regard to the categorization, many studies adopt the so-called dictionary approach, which is a mapping algorithm based on a keyword list (Loughran and McDonald; 2011; Feldam et al. 2010; Kothari et al. 2009; Tetlock et al. 2008; Campbell et al. 2014). However, Li (2012b) points out the limitations of the dictionary approach. First, there is no readily available dictionary that is built for the setting of corporate filings. Second, the dictionary-based approach does not take into consideration the context of a sentence. Though some studies overcome the first problem by developing their own unique word list for corporate filings (Loughran and McDonald 2011; Campbell et al. 2014), the second problem remains unsolved. To overcome the limitation of the dictionary approach, Li (2010a) employs a Naïve Bayesian machine learning algorithm, which is a statistical approach typically used to validate classification efficiency by means of training data.

[8] Bao and Datta (2014) argue that depending on the types (meaningful topics) of risk disclosures, the effects on the risk perception of investors are different, and found that systematic risks increase the risk perceptions of investors.

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On the basis of these arguments, we make a keyword list for 24 risk categories, 16 risk items for idiosyncratic risk and 8 risk items for systematic risk disclosures (Tables A3 and A4 of appendix), based on the disclosure regulations and guidelines (FSA, 2003) to categorize risk content. However, we also set original rules, which enables categorization that includes necessary keywords while excluding unnecessary keywords in considering the content (Table A5 of appendix). This procedure is justified because keywords are sometimes used in discussions about completely unrelated business risks. With this unique category rule, we can mitigate the above context problem in keyword-based categorization.

We use the number of business risk items as a main measure of *N_Risks* to indicate the amounts of business risk disclosure because we focus on the effects of overall risk disclosure on firm risk (and thus on the cost of capital). We counted all the text, including the heading and its explanation, as one risk item (Tables A1 and A2 of appendix). We also use the natural log of Japanese characters (*ln_words*) and natural log of sentence counts (*ln_Sentences*) instead of the number of risk items (*N_Risks*). Appendix shows the details of our risk measures.

Table 1 lists the variables and their definitions.

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Insert Table 1 around here

4. Empirical results

4.1 Changes in total risk following the introduction of mandatory business risk disclosure

We begin by investigating how total risk is affected by the introduction of the new business risk disclosure rules. Panel A of table 2 presents summary statistics for all sample years. Panel B of table 2 shows statistics for each year before and after the introduction of the new disclosure rules. The risk measures are generally lower after the introduction of mandatory business risk disclosure, and the difference is statistically significant. *Roa* and *Growth* are higher after inception, and these might contribute to reducing the firm's level of risk, but *Growth* could increase the cost of capital. We examine the effects of the new regulations regarding textual disclosure of business risks on firms' total risk after controlling for these variables.

Insert Table 2 around here

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Panel A of table 3 shows the simple regression results without the control variables used in equation (2). Note that the estimation result in equation (1) is essentially the same as the result in the panel with individual fixed effects, as discussed earlier. Row 1 shows that the coefficient of *N_Risks* is generally negative and statistically significant in any estimation window of risk measures. The economic impact is generally stronger if the estimation window is shorter, which is consistent with the idea that the information effects must be stronger in the short term. The results indicate that an increase in the number of risk items reported following the introduction of mandatory business risk disclosure reduces information asymmetries between investors, resulting in a decrease in the firm's cost of capital (see Easley and O'Hara ,2004). In this sense, our results seem to be consistent with those of Miihkinen (2013), although he uses bid–ask spread and trading volume as proxies for information asymmetries. However, note that our results are generally contrary to those of previous studies (Campbell et al, 2014). In column 1 of table 3, an increase of one item in *N_Risks* lowers the total risk by about 0.12%.

One concern regarding the results in Panel A of table 3 is that we ignore the year effect. Panel B of Table 3 shows the results with the year dummy *year2003* equal to one for March 2003 and zero otherwise (i.e., March 2004). The variable *year2003* is

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generally positive and statistically significant. However, the coefficient of *N_Risks* remains negative and statistically significant, but the economic impacts are generally becoming weaker in any estimation window of total risks. For example, in column 1, an increase of one item in *N_Risks* decreases the total risk by about 0.05%. The effects of *N_Risks* are less than half of those in the corresponding section in panel A.

Insert Table 3 around here

Table 4 presents the results with individual fixed effects and control variables. Row 1 shows the results for *N_Risks*, which are very close to those in panel B of table 3. Thus, the results indicate that an increase in business risk disclosure in the period following the introduction of mandatory business risk disclosure reduces a firm's cost of capital. *N_Idio_Risks* and *N_Sys_Risks* are the number of risk items regarding idiosyncratic risk and systematic risk disclosures, respectively. (see appendix, in detail). Column 4 of table 4 shows that the coefficient of *N_Idio_Risks* is negative and statistically significant. On the contrary, the coefficient of *N_Sys_Risks* is not statistical significant. These results indicate that the fundamental risk decreases with increases in idiosyncratic risk disclosure in agreement with the idea that an increase in the number of

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business risk items reported in the period following the introduction of mandatory business risk disclosure reduces a firm's cost of capital.

With respect to the control variables, the coefficient of *Size* is positive and statistically significant only in column 1. This implies that the risk level is higher when the firm size is larger, which is consistent with the argument of Linsley and Shrives (2006). The coefficient of *Leverage* is positive and statistically significant. On the other hand, the coefficient of *Roa* is negative indicating that profitability presumably contributes to a decrease in a firm's risk. *Growth* is significantly negative only in column 1.

Insert Table 4 around here

4.2 Cross-sectional effects of mandatory business risk disclosure on total risk

As we have already mentioned, the introduction of mandatory business risk disclosure appears to have decreased firms' cost of capital. However, this result seems to be inconsistent with the results of previous research. To explore this puzzle, we examine the effects of business risk disclosure across firms following the introduction

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of mandatory business risk disclosure by focusing on cross-sectional analyses using only fiscal year 2003 (i.e., *year2004*).

Table 5 presents the results of cross-sectional regression with control variables and industry dummies. Row 1 shows that the coefficient of *N_Risks* is generally positive and statistically significant in any estimation window of total risks. This indicates that business risk disclosure increases investors' assessment of firm risk, and in this sense the results are consistent with those of previous studies. Note that *N_Idio_Risks* is positive and marginally significant at the 10 to 15 % level. In contrast, the coefficient of *N_Sys_Risks* is not statistically significant. These results are qualitatively similar to those of Table 4.

To understand this finding, we need to consider the economic impact of mandatory business risk disclosure. For example, in column 1 of Table 5, the results show that an increase of one item in *N_Risks* raises the total risk by about 0.015%. Recall that the result in the corresponding section in table 4 indicates that an increase of one item in *N_Risks* lowers the total risk by about 0.051%, which is 3.4 times greater than the cross-sectional effects. In this sense, the negative (cost-reducing) effects of enhanced disclosure of business risks overcome the positive (cost-raising) effects,

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although the two effects offset each other. Overall, the (marginal) net effects of the introduction of business risk disclosure reduce a firm's cost of capital[9].

Insert Table 5 around here

4.3 Change effects of mandatory business risk disclosure

To compare with the previous research and address to what extent is due to sample-related differences (e.g., Japan vs. U.S.), we examine the change effects of mandatory business risk disclosure by following the specification of Campbell et al. (2014). Table 6 presents the change effects of business risk disclosures on the total risk, beta and firm-specific risk: *Risk* (+2, +184), *Beta*, and *Firm_Risk*. We estimate the beta and firm-specific risk by estimating the single index model (i.e., market model). Here, the firm-specific risk is defined as the residual of the single index model. The estimation window is 2 days to 184 days after filing annual reports for each fiscal year. Given endogeneity concerns, we add lagged risk variable for each specification. As Campbell

[9] Note that it still needs to be explained why a firm discloses more negative information even if the disclosure is mandatory, because a firm can reduce the cost of capital if the level of business risk disclosure is decreased. As Linsley and Shrives (2006) argue, one possible interpretation is that a higher-risk firm might want to explain how to manage these higher risks successfully.

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et al. (2014) discuss, this specification is akin to implanting a change analysis after the introduction of mandatory business risk disclosures.

Columns 1 to 4 in table 6 show the results of pooled ordinary least squares (OLS) with year and industry dummies. We compute robust standard errors of the estimates clustered at the firm level. Column 1 is the result when we use the total risk as the dependent variable. The result indicates an increase of one item of *N_Risks* increases total risk by about 0.006% on a daily basis (i.e., 0.09% per year; $0.006 \times \sqrt{250}$). The result is qualitatively consistent with that of Campbell et al. (2014).

Columns 2 to 4 are the results when we separate textual business risk disclosures into idiosyncratic and systematic risk disclosures. The coefficient of *N_Idio_Risks* is positive and statistically significant when we use the total risk and firm-specific risk as dependent variable. In contrast, the coefficient of *N_Sys_Risks* is statistical significant only in column 3, when we use the *Beta* as dependent variable. Overall, these results are generally consistent with Campbell et al. (2014), and the results support the idea that business risk disclosures are informative and investors incorporate the information into their risk assessments and thus increase the information component within the cost of capital after the introduction of mandatory business risk disclosure. In this sense our new results seem to be not due to sample-differences.

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Insert Table 6 around here

5. Robustness check

5.1 Effects of mandatory business risk disclosure on new listed firms vs. old listed firms

Even before the introduction of mandatory business risk disclosure, investors might have recognized the risk factors in firms that had listed in recent years. This is partly because new listed firms were required to submit the equivalent of mandatory business risk disclosure reports in their IPO prospectus, as noted in Section 2. To control for this confounding effect, we have estimated the results of table 4 by separating newly listed firms from old listed firms.

Panel A of table 7 presents the results after deleting firms that listed during the preceding five years. The results are qualitatively similar to those in table 4. Panel B of table 7 shows the results for firms that listed in the preceding five years. In contrast to the results of panel A, row 1 of panel B shows that there is an insignificant relationship between total risk and *N_Risks* regardless of the estimation window of the total risk measures. These results are consistent with the view that investors might have recognized the risk factors for firms that had listed in recent years, and thus experienced

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little effect following the introduction of mandatory business risk disclosure. One potential concern is that the sample number in panel B is relatively small. Nonetheless, these results are consistent with the view that increased disclosure in the period following the introduction of mandatory business risk disclosure provides new information for investors and reduces a firm's cost of capital.

Insert Table 7 around here

5.2 Controlling the endogenous effects of business risk disclosure

Even though changes to the rules have made disclosure mandatory, business risk disclosure continues to exhibit a discretionary nature. In other words, firm managers may make strategic choices regarding business risk disclosure. Thus, our results may suffer from endogenous problems, and further estimations via instrumental variables could be warranted. Another compelling reason for the use of instrumental variables is that some of the omitted variables, such as other news that may correlate with risk disclosure, which are compounded in the disturbance term in equation (1), are also likely to affect the dependent variable. This would apply even if the economic disclosure effects were stripped from the real effects by our risk measure. Hence, we

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may still need to strip *N_Risk* of its correlation with the disturbance term via an instrumental variable.

Although Miihkinen (2013) also uses IV estimation as a robustness check, he uses firm leverage, beta, earnings-to-price ratio, and idiosyncratic risk (i.e., firm-specific risk) as instruments. These variables are intrinsically related to firms' risk characteristics, and thus might suffer from the correlation problem with error terms, at least in our specifications. As our key instrument, we use *Filing volume*, which is defined as the number of pages in annual reports. To consider the institutional change, we create the instrument variable *s_volume* by multiplying *Filing volume* by the *year2004* dummy variable, which is equal to one for March 2004 and zero otherwise (i.e., March 2003). We expect that the instrument variable *s_volume* is correlated with the level of textual business risk disclosure, but has little correlation with the error terms of the total risk. Note that the regression coefficients are precisely identified here because the number of endogenous variables equals the number of instruments. We also include each of the variables, other than *N_Risks*, that are specified on the right-hand-side in equation (1).

Insert Table 8 around here

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Column 1 of table 8 shows the estimated result for *N_Risks*, which is known as the first stage of the IV regression. Note that the coefficients of the key instrument (i.e., *s_volume*) are positive and statistically significant, which indicates that they are appropriate instrument variables for *N_risks*. Column 2 of table 8 shows the estimated result for risk determinants, which is known as the second stage of the IV regression. Row 1 of table 8 shows that total risk decreases with additional business risk disclosure. Our results indicate that an increase of one business risk item lowers total risk by about 0.057%. These results still support the idea that business risk disclosure reduces the asymmetric information problem among investors, and thus changes risk perceptions toward a lower cost of capital, even if we control for the potential estimation problems.

5.3 Alternative measures of business risk disclosure

As noted previously, we use the natural log of word counts (*ln_words*) and the natural log of sentence counts (*ln_sentences*) as proxies for business risk disclosure instead of the number of risk items. The results shown in table 4 are reproduced using these alternative risk disclosure measures, and the new results are presented in table 9.

Insert Table 9 around here

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The results are qualitatively similar to the earlier results, thus we can confirm that similar results are obtained regardless of the business risk disclosure measure that is used.

6. Conclusion

In this paper, we have examined mandatory textual business risk disclosure by taking advantage of institutional changes in Japan. We found that the introduction of mandatory business risk disclosure has had a decreasing impact on total risk. This suggests that an increase in business risk disclosure reduces a firm's cost of capital (see Easley and O'Hara,2004), which is contrary to the results of previous studies. We also found that there is a positive relationship between the number of items in business risk disclosure reports and total risk, indicating that business risk disclosure has an increasing impact on investors' assessment of firm risk. Although the two effects offset each other, the effects of enhanced disclosure of business risks on reducing the cost of capital exceed the effects on increasing the cost of capital. In this sense, our empirical evidence rejects the criticism that business risk disclosures suffer from possessing a boilerplate nature and that it has policy implications for financial reporting and disclosure regulation.

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Prior studies have focused on the quality of risk disclosure and its association with information asymmetry (Miihkinen, 2012, 2013). As Abraham and Shrieves (2014) note, the role of stakeholders is very important in improving the quality of risk disclosure. In this paper, we take advantage of institutional changes (i.e., the introduction of mandatory business risk disclosure) to identify the overall effect of business risk disclosure on the cost of capital, but do not focus on the quality of disclosure and its effect on the cost of capital. These are topics for future research.

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APPENDIX. Summary of textual analysis of business risk disclosure

Example of business risk disclosure

To explain the style of business risk disclosures in Japan, we use the example of Panasonic Corporation, an electronics firm in Japan. Panasonic is also listed on the New York Stock Exchange: thus, it submits the 20-F filing because the Securities and Exchange Commission of U. S. require that foreign private issuers file their annual reports on form 20-F. Tables A1 and A2 show typical examples of business risks disclosed in the “Risk Factors” section of 20-F in the United States and the “Business Risk, etc.” section of annual report (Form-3 in Japan), respectively. For our analysis, we

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manually count the number of risk items (*N_risks* in text) found in the "Business Risk, etc." as a measure of the level of business risk disclosure. We consider all the text including the heading and explanation as one risk item.

Table A1 Example of business risk in 20-F by Panasonic

Risks Related to Economic Conditions

Continued or further weakness in Japanese and global economies may cause reduced demand for Panasonic's products

Demand for Panasonic's products and services may be affected by general economic trends in the countries or regions in which Panasonic's products and services are sold. Economic downturns and resulting declines in demand in Panasonic's major markets worldwide may thus adversely affect the Company's business, operating results and financial condition. For fiscal 2013, ending March 31, 2013, the Company continues to anticipate that the business environment will remain sluggish due to various factors including the negative impact of the yen's appreciation and ever-intensified global competition as well as possible slowdown in the global economy due to the European debt crisis.

(abbreviation)

(Filing Data: 2012-06-28, Period of Report: 2012-03-31, Type: 20-F)

Table A2 Example of business risk in Form-3 by Panasonic

経済環境に関するリスク

経済状況の変動

当社グループの製品・サービスに対する需要は、それらの販売を行っている国または地域の経済状況の影響を受けるため、世界の市場における景気後退、およびこれに伴う需要の減少により、当社グループの事業、業績および財政状態が悪影響を受ける可能性があります。平成 24 年度につきましても、円高やグローバルな競争激化に加え、欧州債務危機による世界の景気減速懸念など、厳しい経営環境が続くものと思われます。

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（省略） (Filing Data: 2012-06-28, Period of Report: 2012-03-31, Type: Form-3)

Measuring the content of business risk disclosures

To categorize the risk items into idiosyncratic and systematic risk disclosures, we use IBM SPSS Text Analytics for Surveys 4.0.1 software. This software allow us to categorize our text into 24 predefined categories (24 for idiosyncratic business risk and 8 for systematic business risk; the detailed Tables are upon request). We adopt two approaches in this study: (1) categorization based on a keyword list; and (2) categorization using category rules. Tables A3 and A4 list, respectively, the risk subcategories and the main keywords for idiosyncratic and systematic risk disclosures.

To consider the content of disclosure, we make category rules for categorization, including necessary keywords but also simultaneously excluding unnecessary keywords. For this procedure, we use a function of category rules in the software (The Table of category rule examples is upon request): this enables us to make a categorization that includes necessary keywords while excluding unnecessary keywords. Using these unique category rules, we can mitigate the context problem of keyword-based categorization. Table A5 gives typical examples of category rules.

Table A3 Keywords by categories of idiosyncratic business risk

Risk categories	Main keywords
1. Quality of goods and services	defect, food poisoning, side effect, product, recall, claim, quality, item, service, safety
2. Strategy	strategy, restructuring, reconstruction, project, equity participation, expansion, M&A, alliance, acquisition, partnership, merger, joint
3. Organizational structure	business model, organization, structure, internal control, risk management, control surface, quality control, budget management, corporate governance

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4. Relationship with critical suppliers	OEM, contract, client, supplier, commission, outsourcing, vendor
5. Financial condition	financing, working capital, fund, capital, liability, debt, loan, covenants, financial risk, syndication, credit risk, bankruptcy, deposit, default
6. Information security	information, data, secret, leakage, bug, cyber-terrorism, customer information, security
7. R&D investment	obsolescence, technology, evolution, progress, innovation, invention, R&D, development, trial
8. Operation	asbestos, trouble, accident, failure, damage, blackout, delay, stagnant, pause, break, stop, injuries, human error
9. Intellectual property	royalty, intellectual property, license, copyright, patent, counterfeit goods, imitation, copy
10. Litigation	litigation, plaintiff, defendant, criminal charges, disposal, administrative punishment, site inspections, compliance, illegal, violation
11. Human resources	human resource, key person, chairperson, president, director, skilled technician, staff, engineer, workers, labor, manager, employees, strike
12. Consolidated companies	parent, subsidiary, affiliate, consolidated, group companies, special purpose company
13. Brand value	brand, image, awareness, reliability, credibility, corporate value, rating, rumor
14. Relationship with other companies	relationship, deal
15. Related parties	related parties, major shareholder, founder, preferred stock
16. Going concern	going concern

Table A4 Keywords by categories of systematic business risk

Risk categories	Main keywords
1. Economic conditions	interest rate, economic conditions, economy, market risk, external environment, external factors, exchange rate, foreign currency
2. Business environment	competition, demand, industry, consumer, supply and demand
3. Regulations	regulation, rules, law, authorized, register, certification, administration, tax
4. Purchase of raw materials	raw materials, fuel, crude oil, raw material price
5. Geopolitical situation	import, export, overseas trade, foreign, global, international, world, country, war, country risk, geopolitical risk
6. Natural disasters	natural disaster, earthquake, hazard, weather, climate, season, infection, disease, BSE
7. Accounting standards	accounting, pension accounting, impairment accounting, market valuation, stock option accounting

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8. Environmental issues	pollution, waste, warming, greenhouse gas, emission, exhaust, environment

Table A5 Examples of category rules

Category rules	Example of category rules
A ∧ B （A and B）	Category: Business environment Rule: *Include* both “product” and “price” Heading: Price of product To reduce categorization errors induced by “product,” which is a keyword in the “Quality of goods and services” category
A∧(¬B) （A but not B）	Category: Strategy Rule: *Include* “development” but *exclude* “business” Heading: Risk of new business development To reduce categorization errors induced by “development,” which is a keyword in “R&D investment”
(A∧B)∧(¬C) (A and B, but not C)	Category: Business environment Rule: *Include* both “supply and demand” and “trends” but *exclude* “raw material” Heading: Trends of supply and demand To reduce categorization errors induced by “raw material,” which is a keyword in “Purchase of raw materials”

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Table 1 Definition of varialbes and data sources

Risk measures		**Data sources**
Risk	The standard deviation of daily stock returns for each fiscal year. The estimation windows are three of +2 to +11, +2 to +60, or +2 to +184 from annual report filing day.	Astra manager
Business risk disclosure measures		
N_Risks	The number of risk items disclosed in the "Business Risk, etc." section for March 2004 and zero for March 2003.	Annual Report
ln_words	The natural log of the word count disclosed in the "Business Risk, etc." section for March 2004 and zero for March 2003.	Annual Report
ln_sentences	The natural log of the sentence count disclosed in the "Business Risk, etc." section for March 2004 and zero for March 2003.	Annual Report
Firm's characteristics		

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Size	Natural log of the total assets	NEEDS-FQ
Leverage	Total assets / the book value of equity	NEEDS-FQ
Roa	Business income / the total assets (%)	NEEDS-FQ
Growth	Sales growth (%)	NEEDS-FQ

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Table 2 Summary statistics

Panel A: Descriptive statistics

Risk measures	Mean	Std.dev.	Min	Max	Obs.
Risk					
(+2,+11)	2.178	1.319	0.204	13.67	1,799
(+2,+61)	2.107	0.990	0.332	7.882	1,799
(+2,+184)	2.073	0.878	0.429	6.589	1,799
Business risk disclosure measures					
N_Risks	5.962	3.932	1.000	37.000	911
ln_words	7.103	0.749	4.443	10.069	911
ln_sentences	2.752	0.695	0.000	10.069	911
Firm's characteristics					
Size	11.714	1.381	9.255	15.810	1,742
Leverage	3.513	3.573	1.120	33.220	1,773
Roa	5.266	4.036	-4.315	22.911	1,725
growth	3.666	10.936	-28.13	55.850	1,778

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Panel B: Before vs. After the introduction of business risk disclosure

	Before the introduction	After the introduction		
	mean	mean		t-value
Risk				
(+2, +11)	2.616	1.753	-14.69	***
(+2, +61)	2.392	1.763	-16.28	***
(+2, +184)	2.456	1.769	-15.67	***
N_Risks	na	5.962		
ln_words	na	7.103		
ln_sentences	na	2.752		
Size	11.697	11.732	0.525	
Leverage	3.665	3.366	-1.762	*
Roa	4.783	5.729	4.896	***
Growth	2.751	4.553	3.484	***

For variables definition, see table 1.

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Table 3 Baseline regression results with individual fixed effects

This table presents the results from pooled ordinary least squares with individual fixed effects without control variables as a baseline result. We show the results of the stock return volatility obtained with the estimation windows of 2 to11, 2 to61, and 2 to184 days after filing annual reports for each fiscal year (e.g., *Risk* (+2, +11), etc.). *N_Risks* is the number of risk items disclosed in the "Business Risk, etc." section of annual reports for year 2004, and zero for year 2003.

Panel A: Result without control variables						
	(1) *Risk* (+2, +11)		(2) *Risk* (+2, +61)		(3) *Risk* (+2, +184)	
N_Risks	-0.116		-0.086		-0.082	
	(-14.94)	***	(-17.99)	***	(-21.14)	***
Constant	2.527		2.366		2.319	
	(129.20)	***	(106.36)	***	(129.20)	***
Adj_R_squared	0.23		0.48		0.57	
Obs.	1,797		1,797		1,797	

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Panel B: Result with year effect but without control variables

	(1) *Risk* (+2, +11)		(2) *Risk* (+2, +61)		(3) *Risk* (+2, +184)	
N_Risks	-0.048		-0.018		-0.026	
	(-3.44)	***	(-2.18)	***	(-3.90)	***
year2003	0.577		0.578		0.472	
	(5.86)	***	(9.79)	***	(9.94)	***
Constant	2.037		1.876		1.918	
	(22.43)	***	(34.50)	***	(43.80)	***
Adj_R_squared	0.26		0.53		0.61	
Obs.	1,797		1,797		1,797	

The values in parentheses are *t* statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

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Table 4 Regression results with control variables and individual fixed effects

This table presents the results from pooled ordinary least squares with individual fixed effects with control variables. We present the results of the risk measures obtained with the estimation windows of 2 to 11, 2 to 61, and 2 to 184 days after filing annual reports for each fiscal year (e.g., *Risk* (+2, +11), etc.). *N_Risks* is the number of risk items disclosed in the "Business Risk, etc." section of annual reports for year 2004, and zero for year 2003. *N_Idio_Risks* is the number of idiosyncratic risk items and *N_Sys_Risks* is the number of systematic risk items disclosed in the "Business Risk, etc." section of annual reports. We also include control variables that have any possible effects on a firm's risk. *Size* is the natural log of total assets. *Roa* is the ratio of business income to total assets. *Leverage* is total assets deflated by the book value of equity. *Growth* is the sales growth for each firm. *year2003* is the year dummy that takes a value of one for March 2003, and zero otherwise (i.e., March 2004).

	(1) *Risk* (+2, +11)		(2) *Risk* (+2, +61)		(3) *Risk* (+2, +184)		(4) *Risk* (+2, +184)	
N_Risks	-0.051		-0.016		-0.025			
	(-3.59)	***	(-1.97)	**	(-3.73)	***		
N_Idio_Risks							-0.041	
							(-4.17)	***
N_Sys_Risks							0.007	
							(0.66)	
Size	1.743		0.507		0.069		0.010	
	(3.23)	***	(1.62)		(0.27)		(0.38)	
Leverage	0.056		0.060		0.038		0.040	
	(2.37)	**	(4.33)	***	(3.36)	***	(3.50)	***

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Roa	-0.056		-0.080		-0.074		-0.073	
	(-2.04)	**	(-5.05)	***	(-5.67)	***	(-5.64)	***
Growth	-0.015		-0.004		0.000		0.000	
	(-3.09)	***	(-1.40)		(0.11)		(-0.03)	
year2003	0.517		0.499		0.380		0.344	
	(5.08)	***	(8.43)	***	(7.81)	***	(9.13)	***
Constant	-18.23		-3.839		1.376		0.957	
	(-2.89)	***	(-1.05)		(0.46)		(0.32)	
Adj_R_squared	0.66		0.79		0.82		0.82	
Obs.	1,714		1,714		1,714		1,714	

The values in parentheses are t statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

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Table 5 Cross-sectional regression results with control variables

This table presents the results of cross-sectional regression. We present the results of the risk measures obtained with the estimation window of 2 to 11, 2 to 61, and 2 to 184 days after filing annual reports for each fiscal year (e.g., *Risk* (+2, +11), etc.). *N_Risks* is the number of risk items disclosed in the "Business Risk, etc." section of annual reports. *N_Idio_Risks* is the number of idiosyncratic risk items and *N_Sys_Risks* is the number of systematic risk items disclosed in the "Business Risk, etc." section of annual reports. We also include control variables that indicate any possible effects on a firm's risk. *Size* is the natural log of total assets. *Roa* is the ratio of business income to total assets. *Leverage* is total assets deflated by the book value of equity. *Growth* is the sales growth for each firm from the previous year. We also include industry dummies.

	(1) *Risk* (+2, +11)	(2) *Risk* (+2, +61)	(3) *Risk* (+2, +184)	(4) *Risk* (+2, +184)
N_Risks	0.015 (2.29) **	0.015 (2.40) **	0.010 (1.77) *	
N_Idio_Risks				0.013 (1.58)
N_Sys_Risks				-0.001 (-0.09)
Size	-0.134 (-6.66) ***	-0.166 (-8.89) ***	-0.204 (-11.99) ***	-0.199 (-11.26) ***
Leverage	0.042 (4.56) ***	0.089 (10.40)***	0.080 (10.32) ***	0.081 (10.35) ***

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Roa	0.012		0.006		-0.009		-0.009	
	(1.72)	*	(0.99)		(-1.59)		(-1.62)	
Growth	0.004		-0.001		-0.005**		-0.005	
	(1.39)		(-0.48)		(-2.07)	**	(-2.07)	**
Constant	2.56		2.868		3.367		3.323	
	(4.70)	***	(5.70)	***	(7.34)	***	(7.21)	***
industry dummies	yes		yes		yes		yes	
Adj_R_squared	0.21		0.29		0.33		0.33	
Obs.	874		874		874		874	

The values in parentheses are *t* statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

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Table 6 Change effects business risk disclosure after inception

This table presents the results from pooled ordinary least squares with the year and industry dummy estimation of equation (5). To capture the change effects, we include year lag of dependent variable. We use the total risk (*Risk*) in columns (1) and (2), beta (*Beta*) in column (3), and firm-specific risk (*Firm_Risk*) in column (4), which are estimated by the single index model. We present the results of the risk measures obtained with the estimation window of 2 to184 days for each fiscal year after filing. *N_Risks* is the number of risk items disclosed in the "Business Risk, etc." section of annual reports. *N_Idio_Risks* is the number of idiosyncratic risk items and *N_Sys_Risks* is the number of systematic risk items disclosed in the "Business Risk, etc." section of annual reports. We also include control variables that indicate any possible effects on a firm's risk. *Size* is the natural log of total assets. *Roa* is the ratio of business income to total assets. *Leverage* is total assets deflated by the book value of equity. *Growth* is the sales growth for each firm from the previous year. We include industry dummies.

	(1) *Risk* (+2, +184)	(2) *Risk* (+2, +184)	(3) *Beta*	(4) *Firm_Risk*
N__Risks	0.006 (3.78) ***			
N_Idio_Risks		0.005 (2.42) **	-0.000 (-0.50)	0.009 (4.01) ***
N_Sys_Risks		0.006 (1.64)	0.004 (2.27) **	0.000 (0.08)
Size	-0.068 (-10.42) ***	-0.067 (-9.93) ***	0.006 (1.88) *	-0.095 (-13.42) ***

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Leverage	0.033		0.033		0.015	0.027	
	(2.48)	**	(2.48)	**	(3.35) ***	(2.27)	**
Roa	-0.006		-0.006		-0.003	-0.007	
	(-3.00)	***	(-2.87)	***	(-3.37) ***	(-3.40)	***
Growth	0.001		0.001		0.000	0.000	
	(1.60)		(1.65)	*	(0.01)	(0.65)	
One year lagged Risk (+2,+184)	0.49						
	(28.89)	****					
One year lagged Beta					0.445		
					(27.16) ***		
One year lagged Firm_Risk						0.472	
						(25.65)	***
Constant	1.605		1.611		0.287	1.96	
	(5.10)	***	(5.21)	***	(2.07) **	(9.08)	***
year dummies	yes		yes		yes	yes	
industry dummies	yes		yes		yes	yes	
Adj_R_squared	0.70		0.70		0.44	0.58	
Obs.	5,771		5,771		5,771	5,771	

The values in parentheses are *t* statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level. We compute robust standard errors of the estimates clustered at the firm level.

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Table 7 Regression results with fixed effects: Old vs. New listed firms

This table shows the subsample results using the old listed firms (new firms are dropped) and new listed firms (firms listed in the past 5 years). We present the results of the risk measures obtained with the estimation window of 2 to 11, 2 to 61, and 2 to 184 days after filing annual reports for each fiscal year (e.g., *Risk* (+2, +11), etc.). *N_Risks* is the number of risk items disclosed in the "Business Risk, etc." section of annual reports. We also include control variables that indicate any possible effects on a firm's risk. *Size* is the natural log of total assets. *Roa* is the ratio of business income to total assets. *Leverage* is total assets deflated by the book value of equity. *Growth* is the sales growth for each firm from the previous year. *year2003* is the year dummy that takes a value of one for March 2003, and zero otherwise (i.e., March 2004).

	Panel A: Old listed firms *firms listed more than five years ago*			**Panel B: Newly listed firms** *firms listed within five years*		
	(1) *Risk* (+2, +11)	(2) *Risk* (+2, +61)	(3) *Risk* (+2, +184)	(1) *Risk* (+2, +11)	(2) *Risk* (+2, +61)	(3) *Risk* (+2, +184)
N_Risks	-0.055	-0.020	-0.023	0.003	0.016	-0.035
	(-3.76) ***	(-2.32) **	(-3.34) ***	(0.05)	(0.55)	(-1.38)
Size	1.799	0.689	0.259	3.029	-0.920	-1.229
	(3.29) ***	(2.16) **	(1.00)	(1.00)	(-0.60)	(-0.94)
Leverage	0.056	0.059	0.038	-0.398	-0.305	-0.670
	(2.38) **	(4.31)***	(3.46) ***	(-0.38)	(-0.58)	(-1.48)
Roa	-0.065	-0.094	-0.082	-0.019	0.001	-0.031

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	(-2.28)	**	(-5.63)	***	(-6.06)	***	(-0.18)		(0.02)		(-0.69)	
Growth	-0.017		-0.006		-0.002		0.021		0.022		0.026	
	(-3.55)	***	(-2.06)	**	(-0.94)		(0.90)		(1.88)	*	(2.64)	**
year2003	0.466		0.454		0.360		1.189		0.890		0.706	
	(4.47)	***	(7.48)	***	(7.31)	***	(2.22)	***	(3.30)	***	(3.06)	***
Constant	-18.93		-5.934		-0.847		-29.745		12.385		17.099	
	(-2.95)	***	(-1.59)		(-0.28)		(-0.91)		(0.75)		(1.21)	
Adj_R_squared	0.66		0.79		0.82		0.72		0.81		0.86	
Obs.	1,617		1,617		1,617		97		97		97	

The values in parentheses are t statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

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Table 8 IV regression results with fixed effects

This table presents the results from instrumental variables. The first-stage regression is the estimation of the determinants of *N_Risks*, which is the number of risk items disclosed in the "Business Risk, etc." section of annual reports. The key instruments at the first stage consist of *s_volume*, multiplying *Filing volume* by the dummy variable *year2004*, where *Filing volume* is defined as the number of pages of annual reports and the dummy *year2004* takes a value of one for March 2003, and zero otherwise (i.e., March 2004). The second stage has exactly the same specifications as column 3 in Table 4. We present the result of the risk measures obtained with the estimation window of 2 to 184 days after filing annual reports for each fiscal year We also include control variables that indicate any possible effects on a firm's risk. *Size* is the natural log of total assets. *Roa* is the ratio of business income to total assets. *Leverage* is total assets deflated by the book value of equity. *Growth* is the sales growth for each firm from the previous year. *year2003* is year dummy variable that takes a value of one for March 2003, and zero otherwise (i.e., March 2004).

	OLS		*IV*	
	First_Stage		*Second_Stage*	
	(1)		(2)	
	N_risks		*Risk* (+2, +184)	
N_Risks			-0.057	
			(-2.83)	***
s_volume	0.061			
	(10.32)	***		
Size	1.997		0.127	
	(1.60)		(0.48)	
Leverage	-0.047		0.036	
	(-0.86)		(3.11)	***
Roa	0.080		-0.071	
	(1.26)		(-5.39)	***
Growth	-0.042		-0.001	
	(-3.85)	***	(-0.49)	
year2003	-0.008		0.192	
	(-0.01)		(1.58)	
F-statistics	413.19			
[p-value]	[0.000]			
R_squared	0.82		0.42	

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Obs.	1,676	1,676

The values in parentheses are *t* statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.

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Table 9 Regression results with alternative measures of risk disclosure

This table presents the results from pooled ordinary least squares with individual fixed effects for alternative business risk disclosures. We present the results of the risk measures obtained with the estimation windows of 2 to 11, 2 to 61, and 2 to 184 days after filing annual reports for each fiscal year (e.g., *Risk* (+2, +11), etc.). *ln_words* is the natural log of the Japanese characters count and *ln_sentences* is the natural log of sentence count. We also include control variables that indicate any possible effects on a firm's risk. *Size* is the natural log of total assets. *Roa* is the ratio of business income to total assets. *Leverage* is total assets deflated by the book value of equity. *Growth* is the sales growth for each firm from the previous year. *year2003* is the year dummy that takes a value of one for March 2003, and zero otherwise (i.e., March 2004).

	(1) *Risk* (+2, +11)		(2) *Risk* (+2, +61)		(3)		(4) *Risk* (+2, +11)		(5) *Risk* (+2, +61)		(6) *Risk* (+2, +184)	
ln_words	-0.270		-0.085		-0.127							
	(-3.77)	***	(-2.04)	**	(-3.72)	***						
ln_sentences							-0.284		-0.077		-0.142	
							(-3.69)	***	(-1.71)	*	(-3.85)	***
Size	1.857		0.542		0.120		1.803		0.519*		0.099	
	(3.43)	***	(1.72)	*	(0.46)		(3.34)	***	(1.65)	*	(0.38)	
Leverage	0.055		0.060		0.038		0.056		0.060		0.038	
	(2.30)	**	(4.29)	***	(3.30)	***	(2.33)	**	(4.32)	***	(3.32)	***
Roa	-0.057		-0.081		-0.075		-0.056		-0.080		-0.074	
	(-2.10)	**	(-5.08)	***	(-5.74)	***	(-2.06)	**	(-5.07)	***	(-5.69)	***
Growth	-0.015		-0.004		0.000		-0.015		-0.004		0.000	

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	(-3.07)	***	(-1.38)	(0.17)	(-3.06)	***	(-1.35)	(0.15)
year2003	-1.099		-0.008	-0.375	0.038		0.384	0.139
	(-2.15)	**	(-0.03)	(-1.54)	(0.17)		(3.02)	(1.34)
Constant	-17.93		-3.741	1.535	-18.45		-3.860	1.264
	(-2.85)	***	(-1.02)	(0.51)	(-2.93)	***	(-1.05)	(0.42)
Adj_R_squared	0.66		0.79	0.82	0.66		0.79	0.82
Obs.	1,714		1,714	1,714	1,714		1,714	1,714

The values in parentheses are t statistics. ***Significant at the 1% level. **Significant at the 5% level. *Significant at the 10% level.