

# **Mandatory adoption of business risk disclosure: evidence from Japanese firms**

Hyonok Kim<sup>a\*</sup> and Yukihiro Yasuda<sup>b</sup>

<sup>a</sup> *Faculty of Business Administration, Tokyo Keizai University, 1-7-34 Minami, Kokubunji, Tokyo 185-8502, Japan and Haas School of Business, University of California, Berkeley, CA 94720, USA*

<sup>b</sup> *Graduate School of Commerce and Management, Hitotsubashi University, 2-1 Naka, Kunitachi, Tokyo 186-8601, Japan*

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## **Abstract**

We take advantage of institutional changes and its characteristics in Japan to empirically examine mandatory business risk disclosure. We find that there is a negative impact on total risk from the introduction of mandatory business risk disclosure. This suggests that an increase in business risk disclosure reduces a firm's cost of capital, which is contrary to the results of previous research. However, we also find that there is a positive relationship across firms and years after inception between the amount of business risk disclosure and total risk, indicating that mandatory business risk disclosure has a negative impact on investors' assessment of firms' risk. Although these two effects offset each other, the positive effects of enhanced disclosure of business risks on the cost of capital overcome the negative effects.

\*Corresponding author. Tel: +81-42-328-5940; fax: +81-42-328-7774  
E-mail: hokim@tku.ac.jp (H. Kim), y.yasuda@r.hit-u.ac.jp (Y. Yasuda)

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## **1. Introduction**

We empirically examine the economic effects of textual disclosure focusing on mandatory business risk disclosure. Business risk disclosure in Japan is intended to enable investors to assess a firm's business risk (FSA, 2003), and is equivalent to the risk factor disclosure included in the filing of 10-K forms by firms in the United States. However, it is noteworthy that partly considered business risks appeared in the Management Discussion and Analysis section (MD&A) in the United States before the inception of risk factor 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 introduction of business risk disclosure in Japan and examine whether the introduction of mandatory business risk disclosure increases or decreases investors' assessment of firms' risk.

Business risk disclosure can increase the amount of information that is available regarding a firm's risk, but it is unclear whether this 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 already 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. However, the main 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<sup>1</sup>. Thus, showing that disclosure affects the cost of capital, and by how much, is a challenging topic.

We take advantage of the introduction of business risk disclosure in Japan to capture the *exogenous* variation in the supply of public information to determine whether the introduction of mandatory business risk disclosure increases or decreases investors’ assessment of firms’ risk. There is an additional benefit from focusing on the new business risk disclosure rule. 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.

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 a negative impact on investors’ assessment of firms’ risk. This result is consistent with previous empirical findings. Although the two effects offset each other,

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<sup>1</sup> 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.

the positive effects of enhanced disclosure of business risks on the cost of capital exceed the negative effects. Thus, the net effect of the introduction of mandatory business risk disclosure is a reduction in the cost of capital.

A unique feature of this study is that we focus on the introductory phase of mandatory business risk disclosure because the empirical examination using the data only after the inception, we only capture the effects of the change in business risk disclosure but might 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<sup>2</sup>.

The remainder of this paper is organized as follows. Section 2 discusses the relevant institutional background. Section 3 discusses related literature and develops testable hypotheses. Section 4 describes our identification strategy, and explains the data, research methodology, and variables used in our empirical study. Sections 5 and 6

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<sup>2</sup> 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 reports, Hassan (2009) examines UAE corporate risk disclosures, and Taylor et al. (2010) focus on Australian listed companies.

present our empirical findings and check robustness, respectively. Section 7 provides concluding remarks.

## **2. Institutional background–business risk disclosure in Japan**

In this section, we look briefly at the institutional features of Japanese business risk disclosure. In August 2002, the Financial Service Agency announced the Program for Structural Reform of Securities Markets. This placed great emphasis on encouraging investment in the securities market, where individual investors play a major role. Revisions to the disclosure rules were also required to make the environment favorable for active market participation. One of these revisions was in relation to business risk disclosure.

A revision of the Cabinet Office Ordinance on Disclosure of Corporate Affairs meant that Japanese public firms were required to disclose information regarding their business risks in their annual reports from March 2004. This is equivalent to the risk factor disclosures contained in 10-K filings by firms in the United States. Business risk disclosure is narrative in nature, and is included in the ‘Business Risk, etc.’ section of the firms’ annual reports. The regulation is formally stated as (Form 2 – precautions for recording No. 33):

*“Among information about business and financial conditions in an annual report, all factors that have possible effects on an investor’s decision must be disclosed. The description should be summarized concretely and briefly using plain language. Abnormal changes in financial conditions or performance, reliance on specified clients, products, and technology, related regulations, industrial traditions (or trade practices), management policy, important litigation, and matters relating to executives, large shareholders, and affiliated companies are included in these factors.”*

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 will take advantage of this institutional feature in Japan to identify the effects of textual business risk disclosures in Section 6.1.

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. 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.

### **3. Related literature and hypothesis**

#### 3.1 Previous research findings

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., Campbell et al., 2014; Leuz and Verrecchia, 2000; Botosan and Plumlee, 2002; Kothari et al., 2009).

On the other hand, previous research on business risk disclosure has generally found the opposite results. For example, Campbell et al. (2014) find that firms facing

greater risk disclose more risk information. These risk disclosures are positively associated with standard risk measures such as total risk. Miihkinen (2013) shows that risk disclosure is negatively associated with asymmetric information measured by spreads, but interestingly, this result is opposite to that of Campbell et al. (2014). Kravet and Muslu (2013) show that risk disclosure reveals unknown contingencies and increases the market's perception of risk and uncertainty. Kim and Yasuda (2014) examine the economic effects of disclosure by focusing on mandatory textual business risk disclosure in Japan and find that there is a positive association between the number of items presented in a business risk disclosure report and information risk. They examine the criticism of boilerplate disclosure by focusing on the mandatory aspect of business risk disclosure and controlling the (endogenous) real effects of a firm's risks.

A unique feature of this study is that we focus on the introductory phase of mandatory business risk disclosure because the empirical analyses using the data only after the inception, we can only capture the change effects of business risk disclosures but thus might undervalue the level effects of the disclosures<sup>3</sup>. Overall, these results indicate that business risk disclosure affects investors' risk perceptions and thus increases the cost of capital. However, it is still unclear why managers would disclose information, albeit through a non-boilerplate mandatory disclosure requirement, about the firm that would increase their cost of capital and destroy firm value.

### 3.2 Hypothesis

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<sup>3</sup> 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.

As noted in Section 2, 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 (Kravet and Muslu, 2013), 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.

Theoretically, 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; Easley and O’Hara, 2004; Kelly and Ljungqvist, 2012) because of reduced information asymmetry between investors. If this were true, we would expect increased business risk disclosure to be negatively correlated with a firm’s risk (the convergence argument). 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:

**H0:** Increased business risk disclosure is not associated with firm risk.

## **4. Empirical approach**

### 4.1 Methodology

In this section, we describe our identification strategy. We take advantage of the introduction of mandatory business risk disclosure to capture the exogenous change



in the level of business risk disclosure<sup>4</sup>. 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 change model between these two years:

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

We calculate risk measures using daily stock returns (Risk). This is based on three estimation windows, each beginning 2 days after annual report filing and ending 11, 61, and 184 days after filing for each fiscal year without overlapping the event date of timely disclosures (i.e., the Japanese stock market also requires listed companies to disclose their financial information prior to submitting their annual report)<sup>5</sup>.

$N\_Risk$  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 number of words ( $ln\_words$ ) and 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.

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<sup>4</sup> A similar approach is also used by Gul et al. (2011) in relation to a different topic.

<sup>5</sup> For a more detailed explanation, see Kim and Yasuda (2014).

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 Shrivess (2006) argue that risk disclosure levels reflect firm size more than firm risk. Thus, *Size* 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  $\eta_i$  captures firm  $i$ 's time-invariant characteristics.

## 4.2 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 March 2004). We selected companies listed on the first section of the Tokyo Stock Exchange. We excluded those whose fiscal year did not end on March 31 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 compiled business risk variables manually from the text found in the “Business Risk, etc.” section of annual reports. We used the number of business risk items as a measure of  $N\_Risks$  to indicate 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. Note that there are unique difficulties in the Japanese language such as there being no space between words, and thus we cannot directly apply the text analysis method to English-language disclosure statements. Textual analysis of business risk disclosure applied in our study is discussed in appendix. Although we admit that there might be a better measure for our robustness check, we used the natural log of word counts ( $\ln\_words$ ) and natural log of sentence counts ( $\ln\_Sentences$ ) instead of the number of risk items ( $N\_Risks$ ). Table 1 lists the variables and their definitions.

**Insert Table 1 around here**

## **5. Empirical results**

We present our main empirical findings in this section.

## 5.1 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**

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. 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 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. We also re-categorize the contents of business risk items into idiosyncratic and systematic risk disclosures. We make a keyword list for 24 risk categories based on the

disclosure regulations and guidelines (FSA, 2003) to categorize risk content<sup>6</sup> (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 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**

### 5.2 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

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<sup>6</sup> Idiosyncratic risk disclosures relate to the quality of goods and services, strategy, organizational structure, relationships with critical suppliers, financial conditions, information security, R&D investment, operations, intellectual property, litigation, human resources, consolidated companies, brand value, relationships with other companies, related parties and on-going concerns. Items relating to economic conditions or systematic risk comprise the business environment, regulations, purchase of raw materials, geopolitical conditions, natural disasters, accounting standards and environmental issues.

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 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 firms' risk, and in this sense the results are consistent with those of previous studies. Note that *N\_Idio\_Risks* is positive and marginally significant. 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, 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<sup>7</sup>.

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<sup>7</sup> 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 Shrivs (2006) argue, one possible interpretation is that a higher-risk firm might want to explain how to manage these higher risks successfully.

## Insert Table 5 around here

### 5.3 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. The estimation window is 2–184 days after filing annual reports for each fiscal year. Given endogeneity concerns, we add lagged risk variable for each specification. As Campbell 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.

**Insert Table 6 around here**

## **6. Robustness check**

### 6.1 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 new listed firms from old listed firms.

Panel A of table 7 presents the results after deleting firms that listed during the preceding 5 years. The results are qualitatively similar to those in table 4. Panel B of table 6 shows the results for firms that listed in the preceding 5 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 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**

#### 6.2 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<sup>8</sup>. 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 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 as instruments. These variables are intrinsically related to firms' risk characteristics, and thus might

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<sup>8</sup> Prior studies have examined the determinants of the level of narrative risk disclosure (e.g., Linsley and Shrivess, 2006; Abraham and Cox, 2007; Elshandidy et al., 2013).

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**

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.

### 6.3 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 ( $N\_Risks$ ). 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**

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.

## 7. 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 negative 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 a negative impact on investors' assessment of firms' risk. Although these effects offset each other, the positive effects of enhanced disclosure of business risks on the cost of capital are greater than the negative effects.

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**

In this section, we discuss the textual analysis of business risk disclosure applied in our study.

### **Example of business risk disclosure**

To explain the style of business risk disclosures in Japan and compare those with risk factor disclosures in the United States, 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 require that foreign private issuers file their annual reports on form 20-F. Tables B1 and B2 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 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.

### **Data collection and file processing**

Because Japanese regulations do not require firms to submit their Form-3 (equivalent to 10-K) in a text format, the data of those text files are not available on an electronic data basis. Therefore, we manually created text files for all our sample firms. The procedures was as follows. First, we copied all the text found in the “Business Risk, etc.” section of Form-3 and pasted the text into Excel files for each firm and each year.

**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

(省略)

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

Thus, the precision of our business risk extraction is 100%. Second, we converted formatted text, such as boldface fonts, to plain text. Finally, we excluded extra spaces because written Japanese does not use them.



### **Measure of 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

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Risk subcategory	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
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

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

**Table A5** Examples of category rules

Category rule	Example of category rule
<b>A <math>\wedge</math> B</b> <b>(A and B)</b>	Category: Business environment
	Rule: <i>Include</i> both “product” and “price”
	Heading: Price of product
<b>A <math>\wedge</math> (<math>\neg</math>B)</b> <b>(A but not B)</b>	To reduce categorization errors induced by “product,” which is a keyword in the “Quality of goods and services” category
	Category: Strategy
	Rule: <i>Include</i> “development” but <i>exclude</i> “business”
<b>(A <math>\wedge</math> B) <math>\wedge</math> (<math>\neg</math>C)</b> <b>(A and B, but not C)</b>	Heading: Risk of new business development
	To reduce categorization errors induced by “development,” which is a keyword in “R&D investment”
	Category: Business environment
	Rule:

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*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 variables and data sources**

<b>Risk measures</b>		<b>Data sources</b>
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
<b>Business risk disclosure measures</b>		
<i>N_Risks</i>	The number of risk items disclosed in the “Business Risk, etc.” section for March 2004 and zero for March 2003.	Annual Report
<i>ln_words</i>	The natural log of the word count disclosed in the “Business Risk, etc.” section for March 2004 and zero for March 2003.	Annual Report
<i>ln_sentences</i>	The natural log of the sentence count disclosed in the “Business Risk, etc.” section for March 2004 and zero for March 2003.	Annual Report
<b>Firm’s characteristics</b>		
<i>Size</i>	Natural log of the total assets	NEEDS-FQ
<i>Leverage</i>	Total assets / the book value of equity	NEEDS-FQ
<i>Roa</i>	Business income / the total assets (%)	NEEDS-FQ
<i>Growth</i>	Sales growth (%)	NEEDS-FQ

**Table 2 Summary statistics**

We winsorize all the firm's characteristic variables used in the estimation at the top and bottom of the 1% level.

<b>Panel A: Descriptive statistics</b>					
<b>Risk measures</b>	<b>Mean</b>	<b>Std.dev.</b>	<b>Min</b>	<b>Max</b>	<b>Obs.</b>
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
<b>Business risk disclosure measures</b>					
<i>N_Risks</i>	5.962	3.932	1.000	37.000	911
<i>ln_words</i>	7.103	0.749	4.443	10.069	911
<i>ln_sentences</i>	2.752	0.695	0.000	10.069	911
<b>Firm's characteristics</b>					
<i>Size</i>	11.714	1.381	9.255	15.810	1,742
<i>Leverage</i>	3.513	3.573	1.120	33.220	1,773
<i>Roa</i>	5.266	4.036	-4.315	22.911	1,725
<i>growth</i>	3.666	10.936	-28.13	55.850	1,778

  

<b>Panel B: Descriptive statistics</b>			
<b>Before vs. After the introduction of business risk disclosure</b>			
	<b>Before the introduction mean</b>	<b>After the introduction mean</b>	<b>t-value</b>
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 ***
<i>N_Risks</i>	na	5.962	
<i>ln_words</i>	na	7.103	
<i>ln_sentences</i>	na	2.752	
<i>Size</i>	11.697	11.732	0.525
<i>Leverage</i>	3.665	3.366	-1.762 *
<i>Roa</i>	4.783	5.729	4.896 ***
<i>Growth</i>	2.751	4.553	3.484 ***

**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 present the results of the risk measures obtained with the estimation windows of 2–11, 2–61, and 2–184 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.

<b>Panel A: Result without control variables</b>			
	(1) Risk (+2, +11)	(2) Risk (+2, +61)	(3) Risk (+2, +184)
<i>N_Risks</i>	-0.116 (-14.94) ***	-0.086 (-17.99) ***	-0.082 (-21.14) ***
<i>Constant</i>	2.527 (129.20) ***	2.366 (106.36) ***	2.319 (129.20) ***
<i>Adj_R_squared</i>	0.23	0.48	0.57
<i>Obs.</i>	1,797	1,797	1,797
<b>Panel B: Result with year effect</b>			
	(1) Risk (+2, +11)	(2) Risk (+2, +61)	(3) Risk (+2, +184)
<i>N_Risks</i>	-0.048 (-3.44) ***	-0.018 (-2.18) ***	-0.026 (-3.90) ***
<i>year2003</i>	0.577 (5.86) ***	0.578 (9.79) ***	0.472 (9.94) ***
<i>Constant</i>	2.037 (22.43) ***	1.876 (34.50) ***	1.918 (43.80) ***
<i>Adj_R_squared</i>	0.26	0.53	0.61
<i>Obs.</i>	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.

**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 2–11, 2–61, and 2–184 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, which indicate any possible effects on a firm’s risk. We also include control variables that indicate any possible effects on a firm’s risk. 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)
<i>N_Risks</i>	-0.051 (-3.59) ***	-0.016 (-1.97) **	-0.025 (-3.73) ***	
<i>N_Idio_Risks</i>				-0.041 (-4.17) ***
<i>N_Sys_Risks</i>				0.007 (0.66)
<i>Size</i>			0.069 (0.27)	0.010 (0.38)
<i>Leverage</i>	0.056 (2.37) **	0.060 (4.33) ***	0.038 (3.36) ***	0.040 (3.50) ***
<i>Roa</i>	-0.056 (-2.04) **	-0.080 (-5.05) ***	-0.074 (-5.67) ***	-0.073 (-5.64) ***
<i>Growth</i>	-0.015 (-3.09) ***	-0.004 (-1.40)	0.000 (0.11)	0.000 (-0.03)
<i>year2003</i>	0.517 (5.08) ***	0.499 (8.43) ***	0.380 (7.81) ***	0.344 (9.13) ***
<i>Constant</i>	-18.23 (-2.89) ***	-3.839 (-1.05)	1.376 (0.46)	0.957 (0.32)
<i>Adj_R_squared</i>	0.66	0.79	0.82	0.82
<i>Obs.</i>	1714	1714	1714	1714

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

**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 2–11, 2–61, and 2–184 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, which indicate any possible effects on a firm’s risk. We also include control variables that indicate any possible effects on a firm’s risk. 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.

	(1) Risk (+2, +11)	(2) Risk (+2, +61)	(3) Risk (+2, +184)	(4) Risk (+2, +184)
<i>N_Risks</i>	0.015 (2.29) **	0.015 (2.40) **	0.010 (1.77) *	
<i>N_Idio_Risks</i>				0.013 (1.58)
<i>N_Sys_Risks</i>				-0.001 (-0.09)
<i>Size</i>	-0.134 (-6.66) ***	-0.166 (-8.89) ***	-0.204 (-11.99) ***	-0.199 (-11.26) ***
<i>Leverage</i>	0.042 (4.56) ***	0.089 (10.40)***	0.080 (10.32) ***	0.081 (10.35) ***
<i>Roa</i>	0.012 (1.72) *	0.006 (0.99)	-0.009 (-1.59)	-0.009 (-1.62)
<i>Growth</i>	0.004 (1.39)	-0.001 (-0.48)	-0.005** (-2.07) **	-0.005 (-2.07) **
<i>Constant</i>	2.56 (4.70) ***	2.868 (5.70) ***	3.367 (7.34) ***	3.323 (7.21) ***
<i>industry dummies</i>	yes	yes	yes	yes
<i>Adj_R_squared</i>	0.21	0.29	0.33	0.33
<i>Obs.</i>	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.

**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), beta (Beta), and firm-specific risk (Firm\_Risk), which are estimated by the single index model. We present the results of the risk measures obtained with the estimation window of 2–184 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, which indicate any possible effects on a firm’s risk. 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.

	(1) Risk (+2, +184)	(2) Risk (+2, +184)	(3) Beta	(4) Firm_Risk
<i>N_Risks</i>	0.006 (3.78) ***			
<i>N_Idio_Risks</i>		0.005 (2.42) **	-0.000 (-0.50)	0.009 (4.01) ***
<i>N_Sys_Risks</i>		0.006 (1.64)	0.004 (2.27) **	0.000 (0.08)
<i>Size</i>	-0.068 (-10.42) ***	-0.067 (-9.93) ***	0.006 (1.88) *	-0.095 (-13.42) ***
<i>Leverage</i>	0.033 (2.48) **	0.033 (2.48) **	0.015 (3.35) ***	0.027 (2.27) **
<i>Roa</i>	-0.006 (-3.00) ***	-0.006 (-2.87) ***	-0.003 (-3.37) ***	-0.007 (-3.40) ***
<i>Growth</i>	0.001 (1.60)	0.001 (1.65) *	0.000 (0.01)	0.000 (0.65)
L.Risk (+2,+184)	0.49 (28.89) ****			
L.Beta			0.445 (27.16) ***	
L.Firm_Risk				0.472 (25.65) ***
<i>Constant</i>	1.605 (5.10) ***	1.611 (5.21) ***	0.287 (2.07) **	1.96 (9.08) ***
<i>year dummies</i>	yes	yes	yes	yes
<i>industry dummies</i>	yes	yes	yes	yes
<i>Adj_R_squared</i>	0.70	0.70	0.44	0.58
<i>Obs.</i>	5771	5771	5771	5771

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.

**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 windows of 2–11, 2–61, and 2–184 days after filing annual reports for each fiscal year before and after the year of introduction of mandatory business risk disclosures (i.e., March, 2004).

	<b>Panel A: Old listed firms</b>			<b>Panel B: New listed firms</b>		
	(1) Risk (+2, +11)	(2) Risk (+2, +61)	(3) Risk (+2, +184)	(1) Risk (+2, +11)	(2) Risk (+2, +61)	(3) Risk (+2, +184)
<i>N_Risks</i>	-0.055 (-3.76) ***	-0.020 (-2.32) **	-0.023 (-3.34) ***	0.003 (0.05)	0.016 (0.55)	-0.035 (-1.38)
<i>Size</i>	1.799 (3.29) ***	0.689 (2.16) **	0.259 (1.00)	3.029 (1.00)	-0.920 (-0.60)	-1.229 (-0.94)
<i>Leverage</i>	0.056 (2.38) **	0.059 (4.31) ***	0.038 (3.46) ***	-0.398 (-0.38)	-0.305 (-0.58)	-0.670 (-1.48)
<i>Roa</i>	-0.065 (-2.28) **	-0.094 (-5.63) ***	-0.082 (-6.06) ***	-0.019 (-0.18)	0.001 (0.02)	-0.031 (-0.69)
<i>Growth</i>	-0.017 (-3.55) ***	-0.006 (-2.06) **	-0.002 (-0.94)	0.021 (0.90)	0.022 (1.88) *	0.026 (2.64) **
<i>year2003</i>	0.466 (4.47) ***	0.454 (7.48) ***	0.360 (7.31) ***	1.189 (2.22) ***	0.890 (3.30) ***	0.706 (3.06) ***
<i>Constant</i>	-18.93 (-2.95) ***	-5.934 (-1.59)	-0.847 (-0.28)	-29.745 (-0.91)	12.385 (0.75)	17.099 (1.21)
<i>Adj_R_squared</i>	0.66	0.79	0.82	0.72	0.81	0.86
<i>Obs.</i>	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.

**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 before and after the year of introduction of mandatory business risk disclosures (i.e., March, 2004).

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



**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 2–11, 2–61, and 2–184 days after filing annual reports for each fiscal year before and after the year of introduction of mandatory business risk disclosures (i.e., March, 2004). *ln\_Words* is the natural log of the word count and *ln\_Sentences* is the natural log of sentence count.

	(1) Risk (+2, +11)	(2) Risk (+2, +61)	(3) Risk (+2, +184)	(4) Risk (+2, +11)	(5) Risk (+2, +61)	(6) Risk (+2, +184)
<i>ln_words</i>	-0.270 (-3.77) ***	-0.085 (-2.04) **	-0.127 (-3.72) ***			
<i>ln_sentences</i>				-0.284 (-3.69) ***	-0.077 (-1.71) *	-0.142 (-3.85) ***
<i>Size</i>	1.857 (3.43) ***	0.542 (1.72) *	0.120 (0.46)	1.803 (3.34) ***	0.519* (1.65) *	0.099 (0.38)
<i>Leverage</i>	0.055 (2.30) **	0.060 (4.29) ***	0.038 (3.30) ***	0.056 (2.33) **	0.060 (4.32) ***	0.038 (3.32) ***
<i>Roa</i>	-0.057 (-2.10) **	-0.081 (-5.08) ***	-0.075 (-5.74) ***	-0.056 (-2.06) **	-0.080 (-5.07) ***	-0.074 (-5.69) ***
<i>Growth</i>	-0.015 (-3.07) ***	-0.004 (-1.38)	0.000 (0.17)	-0.015 (-3.06) ***	-0.004 (-1.35)	0.000 (0.15)
<i>year2003</i>	-1.099 (-2.15) **	-0.008 (-0.03)	-0.375 (-1.54)	0.038 (0.17)	0.384 (3.02)	0.139 (1.34)
<i>Constant</i>	-17.93 (-2.85) ***	-3.741 (-1.02)	1.535 (0.51)	-18.45 (-2.93) ***	-3.860 (-1.05)	1.264 (0.42)
<i>Adj_R_squared</i>	0.66	0.79	0.82	0.66	0.79	0.82
<i>Obs.</i>	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.