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The Impact of the Fair Value Evaluation Risk on Crash Risks in the Korean Stock Market

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Abstract: This study attempts to discover whether information risk of fair value affects a firm's crash risk. We assume that the information risk of levels 2 and 3 is likely to be positively related to a firm's crash risk. The results show that information risk is related to increasing crash risk. In addition, we suggest that a firm's governance system affects the production process of fair value hierarchy information. We argue that this effect is likely to decrease a firm's crash risk. Our findings are significant in that we evaluate the usefulness of the fair value accounting system directly or indirectly; we identify the effect of the expanded fair value disclosure since, the adoption of IFRS in 2011, we show that a firm's information asymmetry is another factor that affects its crash risk. Opponents of fair value disclosure argue that the expanded fair value measurement derives more information asymmetry or uncertainty due to the manager's discretion in handling the value of the firm's assets and liabilities. On the other hand, supporters of fair value disclosure suggest that fair value disclosure helps to decrease information asymmetry since, the disclosure transfers ample intrinsic information of the firm to their stakeholders. Our disposition is that if level hierarchy disclosure is manipulated by the manager's discretion, the information asymmetry that exists in the level hierarchy is likely to affect the firm's crash risk.

Key words: Fair value hierarchy, information risk, crash risk, NCSKEW, governance system

INTRODUCTION

In Korea, all the listed firms are required to adopt the International Financial Reporting Standard (IFRS) since, 2011. Under the IFRS, they face a dramatic change in the accounting environment such as rule-based accounting to principal-based accounting. In particular, they are required to adopt fair value accounting for their assets and liabilities more comprehensively than prior K-GAAP. Furthermore, IFRS requires fair value hierarchy disclosure (Level 1-3) in order to enhance the usefulness of accounting information (IFRS No. 13 requires a disclosure to be divided as level 1-3 according to reliable price of fair value measurement. Level 1 includes assets and liabilities if they are traded in active markets. Level 2 includes non-trading assets and liabilities whose prices are still observable from similar assets or liabilities. Level 3 discloses assets and liabilities whose prices are unobservable). IFRS announced the IFRS 13 to establish a basic framework for fair value accounting in 2011. US firms have adopted the fundamental frame suggested in the SFAS 157, since 2007 for fair value accounting. IFRS 13 and SFAS 157 consistently, require the level hierarchy information to acquire more market preference information in the financial statements. Both SFAS No. 157 and IFRS No. 13 require hierarchical disclosure from the listed firms if the same kind of assets and liabilities are traded in active markets, they should be reported as level 1 if similar assets and liabilities are traded in active markets with benchmark price, they are to be reported as level 2 if certain assets and liabilities are not traded in active markets or with benchmark price, the firms are required to measure fair value by using their own specific estimation models for level 3 assets and liabilities (This disclosure procedure is introduced in Fig. 1).

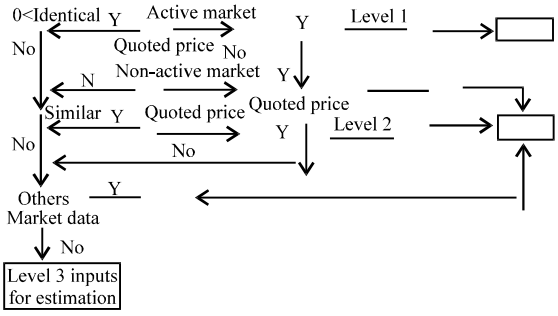

Fig. 1: The application of the fair value hierarchy information

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Several studiess report the usefulness of fair value measurement reported according to the level hierarchy under the SFAS No. 157 and IFRS No. 13. In particular, Landsman (2007) and Penman (2007) argue estimation errors increase for fair value measurement due to managers' discretion as, they estimate fair value; therefore, it is likely to deteriorate reliability of the accounting information. Aboody *et al.* (2006) and Bartov *et al.* (2007) report that manager shows opportunistic behavior while pursuing their private interests by manipulating fair value estimations. Based on these findings, Yi, etc., argue that there is difference in value relevance in regards to stock price in the level hierarchy since potential information asymmetry within level 2 and 3 is relatively lager than in level 1. In addition, Riedl and Serafeim (2011), Im and coauthors suggest that information risk by level hierarchy disclosure differs in that information risk of level 3 is relatively greater than that of level 1 and 2, since level 3 is likely to contain more information uncertainty than the others. They also argue that information risk related to level 3 is likely to derive more cost of capital.

In the meantime, Jin and Myers (2006), Piotroski and Roulstone (2004), Hutton *et al.* (2009), Lee and Im (2014) suggest that a firm's information asymmetry is the main cause of the deterioration of financial stability. In particular, Jin and Myers (2006) identify high information asymmetry (opacity) is associated to R^2 which they argue, affects the firm's stock crash risk. Hutton *et al.* (2009), Kim *et al.* (2011), Lee and Im (2014) also show that accounting qualities are likely to affect a firm's stock crash risk. Therefore, we attempt to identify the effect of information asymmetry in level hierarchy disclosure on the firm's crash risk.

Our contributions are as follow: first, we aim to evaluate the usefulness of the fair value accounting system directly or indirectly by identifying the effect of the expanded fair value disclosure by the adoption of IFRS, since 2011. Opponents of fair value disclosure argue that the expanded fair value measurement derives more information asymmetry or uncertainty due to the manager's discretion in handling the value of the firm's assets and liabilities. On the other hand, supporters of fair value disclosure suggest that fair value disclosure helps to decrease information asymmetry, since the disclosure transfers ample intrinsic information of the firm to their stakeholders. Our disposition is that if level hierarchy disclosure is manipulated by the manager's discretion, the information asymmetry that exists in the level hierarchy affects the firm's financial stability. Second, we aim to show that a firm's information asymmetry is another factor that affects the firm's crash risk, aside from the firm's financial environment (Jin and Myers, 2006; Piotroski and Roulstone, 2004), regulation (Li *et al.*, 2004), tax avoidance (Kim *et al.*, 2011) and accounting qualities (Hutton *et al.*, 2009; Kim *et al.*, 2011; Lee and Im, 2014) which are the main factors that affect the firm's crash risk.

Literature review

Information risk of fair value disclosure: FASB requires hierarchy disclosure for fair value measurement (FAS No. 157: fair value measurement). Input for Level 1 is the active market price and the quoted market price is the single primary basis for the measurement of fair value. Therefore, the information asymmetry in level 1 is relatively less than in the others. Input for Level 2 is determined when the benchmark price exists in the active market, fundamentally reflecting a similar market price. Input for level 3 is not easily observed in the market and thus assets or liabilities included in level 3 depend on the manager's assumptions.

The difference among level 1-3 is in the manager's discretion as they estimate the fair value measurement since level 2 and 3 reflect the manager's subjective judgement on the prices more than level 1 does. Aboody *et al.* (2006) and Bartov *et al.* (2007) report that mangers are highly associated with the manipulation of the inputs for fair value measurement. Researchers have asserted that value relevance among level 1-3 significantly differs from one another. Yi, etc., shows that level 3 contains relatively lower value relevance than level 1 and 2, since there exists a significant difference in reliability during fair value measurement.

Ultimately, the fair value measurement of level 2 and 3 is likely to contain more information asymmetry than that of level 1, since the subjectivity in the fair value measurement for level 2 and 3 generate estimation errors. Also, this information risk from such subjective estimation is related to the accounting qualities that affect firm's cost of capital, reversal investment choice and liquidation risk (Diamond and Verrecchia, 1991).

Information risk and crash risk: Jin and Myers (2006) describe that managers are likely to transfer the losses from contemporary bad performance in order to maintain their position but they cannot afford any loss when a series of sufficiently bad news continues. In other words, they tend to take the abandonment option. If they abandon their position, the bad news that has accumulated is released at once in the market, causing stock crashes. Also, in the statistical aspect, this effect produces long left tails. Jin and Myers (2006) suggest that if the amount of accumulated bad news reaches the

tipping point, the firm's bad news is likely to be released at once in the market, resulting in the firm's financial instability and stock crashes.

In addition, Hutton *et al.* (2009), Kim *et al.* (2011), Lee and Im (2014) provide evidence for the assertion that the accounting qualities created by a firm are associated to its stock crashes. In particular, Lee and Im (2014) report that the information asymmetry is likely to cause stock crashes by suggesting that two different accounting qualities (innate accruals and discretionary accrual) are highly related to stock crash risk. Thus, based on these findings, we provide our main hypothesis as follows:

- H_1: the information risk derived from fair value measurement is likely to increase the possibility of a firm's crash risk

Governance structure can be an influential factor for a firm's varied decision-making. For example, a corporate governance structure that monitors and controls the managers is likely to affect the firm's information uncertainty. Geczy and coauthors present that a firm's frequent speculation behavior is linked to a weak corporate governance mechanism. Furthermore, Yi and coauthors find that governance system affects the relevance of fair value hierarchy information. They argue that when a firm's governance system improves, the evaluation of the investors for fair value assets and liabilities reaches 1 or 1 as theoretically estimated coefficients for assets and liabilities. This indicates the importance of a governance system which mitigates the information asymmetry related to level 2 and 3.

Therefore, we expect that the relation between a firm's reporting transparency of fair value disclosure and the firm's crash risk differs depending on the firm's governance system:

- H_2: a firm's governance system weakens the connection between information risk and crash risk

MATERIALS AND METHODS

Research design

Information risk from fair value hierarchy: We measure the level ratio which represents a firm's information risk by using the level hierarchy through fair value disclosure and then investigate the effect of information risk on the firm's financial stabilities. As prior evidence suggests, level 2 and 3 are likely to contain more information uncertainty than level 1, since managers are authorized discretion when they estimate the values of assets and liabilities, subjectively. Riedl and Serafeim also suggest that level 2 and 3 are more likely to related to the firm's cost of equity (stock beta) than level 1, since level 2 and 3 contain more information uncertainty than level 1. In addition, Im and coauthors report that information risk of fair value measurement is related to a firm's cost of capital (This study examines whether information risk of fair value hierarchy information affects a firm's cost of capital. They assume that information risk in level 2 and 3 is higher than in level 1 and examine whether information risk is positively related to implied cost of equity. Therefore, we adopt the information risk measure to identify the effect of information risk from fair value measurement on a firm's crash risk (We attempt to divide the information risk of fair value because each level has distinct information uncertainty. Thus, we suggest INRISK 1 and INRISK 2 according to information uncertainty. INRISK 1 is represented as (Level 2+3)/total level; INRISK 2 is (Level 3)/total level following):

$$\begin{aligned} INRISK1_{it} &= \left(Level2_{it} + Level3_{it}\right) / \\ &\quad \left(Level1_{it} + Level2_{it} + Level3_{it}\right) \\ INRISK2_{it} &= \left(Level3_{it}\right) \\ &\quad \left(Level1_{it} + Level2_{it} + Level3_{it}\right) \end{aligned} \tag{1}$$

Crash risk (NCSKEW): Based on the prior evidence, we attempt to identify the effect of changes in the financial statement disclosure for fair value accounting on a firm's financial stability. Therefore, we suggest, Eq. 2 to measure the firm's crash risk as the proxy of firm's financial stability and estimate $\epsilon_{j,\tau}$ (weekly abnormal return) by executing the firm year regression. We also derive R^2 and residual returns as follows:

$$\begin{aligned} r_{j,t} &= \alpha_j + \beta_{1,j} r_{m,t-1} + \beta_{2,j} r_{j,t-1} + \beta_{3,j} r_{m,t} \\ &\quad \beta_{4,j} r_{j,t} + \beta_{5,j} r_{m,t+1} + \beta_{6,j} r_{j,t+1} + \varepsilon_{j,t} \end{aligned} \tag{2}$$

Where:

$r_{i,t}$ = The return on stock j in week t

$r_{m,t}$ = The return on the market index (KOSPI index, KOSDAQ index) in week t

$\varepsilon_{i,t}$ = Residual in Eq. 1, the firm-specific weekly abnormal return for firm j in week t

Here, r_{jt} indicates stock return of firm j at t. The r_{Mt} stands for the market return from stock market index such as KOSPI 200 and Sand P 500. The r_{it} stands for the return on an individual stock. Also, we add 1 for residual stock returns to transform the rough symmetric distribution into a sharp symmetric distribution, since the residuals derived from Eq. 2 are likely to be high. Therefore, we have the

firm-specific weekly returns for firm j in week t by measuring the natural log value of one plus the residual return in Eq. 2 which is $W_{j,t} = \ln(1+\varepsilon_{i,t})$. This transformation enables us to define a crash risk or jump risk by matching the residual return with the standard deviation value of the return that is below or above the average.

We use the Negative Conditional return Skewness (NCSKEW) as the measurement of crash risk (Chen *et al*., 2001). First, we take the negative value of the third moment of firm-specific weekly returns for year-firm observations and this measure (NCSKEW) is generated from the division of the value by the standard deviation of firm-specific return to the third power as follows:

$$NCSKEW_{j,t} = -\left[n(n-1)^{\frac{3}{2}}\sum W_{jt}^{3}\right] / \left[(n-1)(n-2)\left(\sum W_{jt}^{2}\right)^{\frac{3}{2}}\right] \quad (3)$$

Research models: We set the model to show the relation between fair value disclosure and a firm's crash risk as follows:

$$NCSKEW_{(i,t)} = \alpha_0 + \alpha_1 INRISK_{(i,t)} + \alpha_2 DTURN_{(i,t-1)} + \alpha_3 RET_{(i,t-1)} + \alpha_4 SIZE_{(i,t-1)} + \alpha_5 MB_{(i,t-1)} + \alpha_{(640Elo3e")} \quad (4)$$

Where:

$NCSKEW_{i,t}$ = The negative skewness of firm-specific weekly returns over the fiscal year period of firm j at year t

$CRASH_{i,t}$ = The indicator variable that takes the value of one for a firm-year that experiences one or more firm-specific weekly returns of firm j at year t

$DTURN_{i,t-1}$ = The average of firm-specific weekly trading turnover over the fiscal year period of firm j at year t-1

$SIGMA_{i,t-1}$ = The standard deviation of firm-specific weekly returns over the fiscal year period of firm j at year t-1

$RET_{i,t-1}$ = The mean of firm-specific weekly returns over the fiscal year period, times 100

$SIZE_{i,t-1}$ = The log value of market value of firm j at year t-1

$Mb_{i,t-1}$ = The market value of the equity divided by the book value of equity of firm j at year t-1

$LEV_{i,t-1}$ = The total debts divided by total assets of firm j at year t-1

$ROA_{i,t-1}$ = The income divided by average total assets of firm j at year t-1

$NCSKEW_{i,t-1}$ = The negative skewness of firm-specific weekly returns over the fiscal year period of firm j at year t-1

$OPAQUE_{i,t-1}$ = The moving sum of the absolute value of discretionary accruals over the last three years (years t-1, t-2 and t-3) of firm j at year t-1

$INDUS_{i,t}$ = Industry dummy

$\varepsilon_{i,t}$ = The residual value of firm i at t

First, we use the $NCSKEW_{it,\ 1}$ as the independent variable to test whether the information risk of fair value affects a firm's crash risk. In addition, we set the model to show the effect of healthy governance system on the relation of information risk and the firm's crash risk as follows:

$$NCSKEW_{(i,t)} = \alpha_0 + \alpha_1 INRISK_{(i,t)} + \alpha_2 DTURN_{(i,t-1)} + \alpha_3 RET_{(i,t-1)} + \alpha_4 SIZE_{(i,t-1)} + \alpha_5 MB_{(i,t-1)} + \alpha_{(640Elo3e")} \quad (5)$$

Where:

$GOV_{i,t}$ = The ratio of large share-holders of firm j at year t

$GOV \times INRISK_{i,t}$ = The interaction variable of governance and information risk of fair value of firm j at year t

We suggest control variables as follows. First, $DTURN_{t-1}$ is the detrended average weekly stock turnover ratio in year t-1. Chen *et al*. (2001) use this variable to control different opinions among investors. They identify a positive relation between the detrended turnover ratio and future crash risk. We also adopt $SIGMA_{t-1}$ as the proxy of stock volatility because it indicates that more volatile stocks tend to suffer more from stock crash in the future than less volatile stocks (Chen *et al*., 2001). This variable is defined as the standard deviation of firm-specific weekly returns. The RET_{t-1} is the average firm-specific weekly returns in year t-1. It is also the main control variable because high average past returns are regarded as significant causes of future stock crash. Chen *et al*. (2001), Hutton *et al*. (2009) and Kim *et al*. (2011) identify a positive relation between firm size and future stock crash. The $SIZE_{t-1}$ is measured by the log of the market value equity in year t-1. Moreover, the firm's growth is related to its future stock crash. Thus, we use MTB_{t-1} to control the firm's

growth effect. The MTB_{t-1} defined as the market value of equity divided by the book value of equity in year t-1. Hutton *et al.* (2009) suggest that financial leverage and operating performance are both negatively related to crash risk. Therefore, we select LEV_{t-1} which is the total debt divided by total assets. The ROA_{t-1} is a measured net income divided by average total assets. Finally, we add the Year Dummy (ΣYD) in the main research models.

Sample data: We test the effect of information risk measured by fair value disclosure on the firm's crash risk. Our sample period is from 2011-2012 because Korea has adopted the K-IFRS, since 2011 and subsequently, disclosed fair value hierarchy information. The sample includes the 200 KOSPI firms since, we assume that large companies disclose more reliable financial information than smaller ones. Thus, we use the 200 KOSPI firms from 2011-2012 in order to find the effect of information risk by fair value disclosure on the firm's crash risks. Financial information and stock market data of the firms are attained from FN guide Pro and we collect the fair value hierarchy information from DART (Data Analysis, Retrieval and Transfer system). Finally, we use 232 firm year observations among the 200 KOSPI firms from 2011-2012.

RESULTS AND DISCUSSION

Descriptive statistics and correlation analyses: Table 1 shows the descriptive statistics of the main variables (Table 1 shows descriptive statistics for the variables used in the main regression analyses. All variables are defined in the Appendix 1. The number of the sample based on research data for the main dependent variables (NCSKEW) is 276 firm-year observations from 2011 to 2012. Also, we exclude the value of non-useful information such as the main independent variable INRISK1. All the variables are defined in the Appendix 1). NCSKEW which is used to test the effect of information risk on the firm's crash risk as the main dependent variable has a mean (median) value of 0.000. The mean values of information risk measures of fair value hierarchy (INRISK 1 and INRISK 2) are 0.497 and 0.219, respectively. Table 2 presents the pearson-correlation matrix result of the main variables (Table 2 presents results from the pearson-correlation analysis among the main variables used in the research models. We suggest coefficient estimates, among which the numbers in bold indicate at least 5% level of significance. All variables are defined in the Appendix 1). First, the coefficient between NCSKEW and INRISK is 0.098 which is significant; this supports the notion that information risk of fair value leads to high crash risks. In addition, the interaction term for the effect of the firm's governance system on the relation between information risk of fair value and the firm's crash risks (GOV×INRISK 1 and GOV×INRISK 2) shows a negative (-) relation from which we deduce that a firm's healthy governance system mitigates the effect of information risk of fair value on its crash risks. The firm size (SIZE) is positively (-) related to a firm's crash risks.

Main results for hypotheses (H_1, H_2): We present the result of the test in Table 3 to see whether the information risk of fair value affects a firm's crash risk (Table 3 suggests the results of the test to identify the effect of the information risk of fair value on firm's crash risk (with the value estimated with NCSKEWE) in the regression Eq. 4.

Table 1: Summery stat

Variables	Obs.	Mean	SD	Min.	Max.
$NCSKEW_t$	276	0.000	0.720	-3.308	2.186
$INRISK1_t$	276	0.497	0.394	0.000	1.000
$INRISK2_t$	276	0.219	0.308	0.000	1.000
$DTURN_{t-1}$	240	-0.001	0.005	-0.034	0.017
$SIGMA_{t-1}$	244	5.693	1.687	2.138	13.152
RET_{t-1}	244	0.345	0.782	-2.509	2.624
$SIZE_{t-1}$	244	21.238	1.426	18.830	25.772
MB_{t-1}	244	1.662	1.712	0.183	17.504
LEV_{t-1}	244	0.496	0.181	0.113	0.908
ROA_{t-1}	244	0.060	0.083	-0.400	0.850
$OPAQUE_{t-1}$	236	0.185	0.118	0.026	0.648

Table 2: The Result of pearson correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
$NCSKEW_t$	1.000													
$INRISK1_t$	0.098	1.000												
$INRISK2_t$	0.170	0.472	1.000											
$NCSKEW_{t-1}$	0.015	-0.102	-0.050	1.000										
$DTURN_{t-1}$	0.035	0.002	0.009	-0.158	1.000									
$SIGMA_{t-1}$	0.116	-0.102	0.129	-0.170	0.207	1.000								
RET_{t-1}	0.029	0.019	0.075	-0.549	0.168	0.174	1.000							
$SIZE_{t-1}$	0.211	-0.083	-0.051	0.118	-0.025	-0.078	0.079	1.000						
MB_{t-1}	0.089	0.018	0.129	0.012	-0.124	0.106	0.294	0.162	1.000					
LEV_{t-1}	0.043	0.076	0.098	0.040	-0.064	0.306	-0.069	0.128	0.059	1.000				
ROA_{t-1}	0.104	0.008	-0.038	0.022	0.028	-0.291	0.102	0.185	-0.045	-0.344	1.000			
$OPAQUE_{t-1}$	-0.036	0.010	-0.035	-0.135	-0.100	0.220	0.201	0.024	0.306	0.156	0.020	1.000		
GOV×$INRISK\ 1_t$	0.028	0.293	0.234	-0.009	-0.072	0.003	-0.047	0.247	0.153	-0.017	0.111	0.077	1.000	
GOV×$INRISK\ 2_t$	-0.013	0.207	0.472	0.011	-0.126	0.043	-0.045	0.213	0.231	0.025	0.106	0.042	0.720	1.000

Table 3: Empirical result of the effect of fair value information risk on crash risk

NCSKEW	Predict	Coef.	p-value	Coef.	p-value
$INRISK\ 1_t$	+	0.211	0.077		
$INRISK\ 2_t$	+			0.339	0.025
$NCSKEW_{t-1}$		0.033	0.669	0.020	0.796
$DTURN_{t-1}$		-11.612	0.331	-11.324	0.341
$SIGMA_{t-1}$		0.027	0.467	0.027	0.453
RET_{t-1}		0.087	0.365	0.063	0.506
$SIZE_{t-1}$		0.089	0.012	0.093	0.009
MB_{t-1}		0.031	0.318	0.024	0.448
LEV_{t-1}		0.184	0.547	0.136	0.656
ROA_{t-1}		1.016	0.115	1.014	0.114
$OPAQUE_{t-1}$		-0.517	0.260	-0.433	0.345
Year Dummy		**Included**		**Included**	
F-value		2.740		2.940	
Adj_R		0.076		0.084	
No. of obs.		232.000		232.000	

Across all the regressions, we take N = 232 for Eq. 4 using firm years observations from 2011 to 2012. We suggest coefficient estimates with P value, only significant if p>0.05 (or 0.10). Column 1 shows the coefficient value wherein the dependent variable is NCSKEW as the proxy of firm's crash risk with main independent variable INRISK1((Level 2+Level3)/Total Level)), representing the information risk of fair value disclosure. Column 2 presents the results from similar regression analyses as column 1 with INRISK2 (Level3/Total Level). All the variables are defined in the Appendix 1). First, the results from column 1 and 2 report the effect of information risk of fair value on the firm's crash risk. INRISK 1 suggests a significant positive (+) relation with NCSKEW (Coef = 0.211, p = 0.077). It also indicates information risk of fair value (INRISK 1) is likely to increase a firm's crash risk. Furthermore, another variable of information risk (INRISK 2) also shows a positive significant relation to crash risk (NCSKEW). This indicates that when information risk of fair value is present, information risk is likely to derive a firm's crash risk.

In addition, Table 4 represents the effect of a firm's governance system on the relation between information risk of fair value and crash risk (Table 4 suggests the results of the test to identify the effect of governance system for the relation of information risk of fair value and firm's crash risk. We add the interaction variables (Gov×INRISK1 and Gov×INRISK2) to identify the governance effect on the relation (with the value estimated with NCSKEWE) in the regression Eq. 5.

Across all the regressions, we take N = 232 for Eq. 5 using firm years observations from 2011 to 2012. We suggest coefficient estimates with p value, only significant if p>0.05 (or 0.10). Column 1 shows the coefficient value wherein the dependent variable is NCSKEW as the proxy of firm's crash risk with main independent variable GOV×INRISK1 ((Level 2+3)/Total

Table 4: Empirical result of the effect of governance system on the relation of fair value information risk and crash risk

NCSKEW	Predict	Coef.	p-value	Coef.	p-value
$INRISK\ 1_t$	+	0.306	0.017		
$INRISK\ 2_t$	+			0.605	0.001
$NCSKEW_{t-1}$		0.017	0.828	-0.012	0.874
$DTURN_{t-1}$		-12.272	0.301	-14.476	0.217
$SIGMA_{t-1}$		0.032	0.38	0.041	0.254
RET_{t-1}		0.055	0.568	-0.002	0.979
$SIZE_{t-1}$		0.11	0.003	0.123	0.001
MB_{t-1}		0.041	0.191	0.043	0.167
LEV_{t-1}		0.116	0.702	0.045	0.882
ROA_{t-1}		1.118	0.082	1.26	0.048
$OPAQUE_{t-1}$		-0.463	0.309	-0.423	0.348
$GOV{\times}INRISK\ 1_t$	-	-0.382	0.041		
$GOV{\times}INRISK\ 2_t$	-			-0.824	0.003
Year Dummy		**Included**		**Included**	
F-value		2.9		3.540	Adj_R
		0.09		0.117	
No. of obs.		232		232	

Level)), representing the information risk of fair value disclosure. Column 2 presents the results from similar regression analyses as column 1 with GOV×INRISK2 (Level3/Total Level). All the variables are defined in the Appendix (1). First, the results from column 1 and 2 for the effect of information risk of fair value (INRISK 1 and-2) on the firm's crash risk show a significant positive (+) relation to NCSKEW (INRISK 1: Coef. = 0.306, p = 0.017, INRISK 2: Coef. = 0.605, p = 0.001). These results support our first hypothesis and so do the results shown in Table 3. Second, we find that the interaction term (GOV×INRISK 1) column 1 in Table 3 is negatively related to NCSKEW (Coef. =-0.382, p = 0.041). Furthermore, another interaction variable (GOV×INRISK 2) of column 1 in Table 3 suggests the same (Coef. =-0.824, p = 0.003). Thus, our findings support the hypothesis that a firm's healthy governance system mitigates the effect of information risk that may occur through the process of fair value measurement on the firm's crash risk.

CONCLUSION

This study attempts to uncover whether information risk of fair value affects a firm's crash risk. We expected that the information risk of levels 2 and 3 is likely to be positively related to its crash risk. The results show that information risk is associated with increasing crash risk. In addition, we suggest that a firm's governance system affects the production process of fair value hierarchy information. Thus, we contend that this effect is likely to decrease a firm's crash risk.

Our contributions are as follow: first, we evaluate the usefulness of the fair value accounting system directly or indirectly; we identify the effect of the expanded fair value disclosure since the adoption of IFRS in 2011, we also

show that a firm's information asymmetry is another factor that affects the firm's crash risk. Opponents of fair value disclosure argue that the expanded fair value measurement derives more information asymmetry or uncertainty due to the manager's discretion in handling the value of the firm's assets and liabilities.

On the other hand, supporters of fair value disclosure suggest that fair value disclosure helps to decrease information asymmetry, since the disclosure transfers ample intrinsic information of the firm to their stakeholders. Our disposition is that if level hierarchy disclosure is manipulated by the manager's discretion, the information asymmetry that exists in the level hierarchy is likely to affect the firm's crash risk.

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APPENDIX 1

Variable definitions

Dependent variables

NCSKEW: the negative skewness of firm-specific weekly returns over the fiscal year period.

Interest variables:

- INRISK 1: assets listed as levels 2 and 3 fair value divided by total fair value assets for firm i at the end of year t
- INRSIK 2: assets listed as 3 fair value divided by total fair value assets for firm i at the end of year t
- GOV*INRISK 1: the INRISK 1 multiplied by the GOV as an interaction term for firm i at year t
- GOV*INRISK 2: the INRISK 2 multiplied by the GOV as an interaction term for firm i at year t

Control variables:

- DTURN: the average of firm-specific weekly trading turnover over the fiscal year period of firm j at year t-1
- SIGMA: the standard deviation of firm-specific weekly returns over the fiscal year period of firm j at year t-1
- RET: the mean of firm-specific weekly returns over the fiscal year period, times 100
- SIZE: the log value of market value of firm j at year t-1
- MB: the market value of the equity divided by the book value of equity of firm j at year t-1
- LEV: total debts divided by total assets of firm j at year t-1
- ROA: income divided by average total assets of firm j at year t-1
- OPAQUE: the variable OPAQUE (denoted by OPAQUE by Hutton *et al*., 2009) is the moving sum of the absolute value of discretionary accruals over the last three years (years t-1, 2 and 3)
- Year dummy: year dummy

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