“Earnings management and idiosyncratic risk – evidence from the post-Sarbanes-Oxley Act period”

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Earnings management and idiosyncratic risk-evidence from the post-Sarbanes-Oxley Act period

Abstract

This paper studies the relationships existed between earnings management and idiosyncratic risk. It is noted that idiosyncratic risk is positively associated with earnings management, while idiosyncratic risk is negatively (positively) associated with accrual-based earnings management in the Sarbanes-Oxley Act (global financial crisis) period. These results, however, may reverse when they are measured employing the real earnings management. Further, the result proves that market share shirking is the justification to induce managers to switch their earnings management method from real-based to the accrual-based during the global financial crisis period.

Keywords: global financial crisis, Sarbanes-Oxley Act period, earnings management, idiosyncratic risk.
JEL Classification: M41.

Introduction

Stock returns in the U.S have become more volatile since 1960 because of the deteriorating financial reporting quality. Rajgopal and Venkatachalam (2011) prove that the deteriorating earnings quality is associated with higher idiosyncratic return volatility. They use accrual quality and accrual-based earnings management as the proxy to measure the financial reporting quality. However, accrual-based earnings management is not the only technique to manipulate earnings. The passage of Sarbanes-Oxley Act (SOX) causes managers to switch from an accrual-based earnings management to a real-based earnings management (Cohen, Dey and Lys, 2008). Cohen and Zarowin (2010) indicate that managers significantly increase the level of real earnings management to avoid the detection particularly when firms implement Seasoned Equity Offerings in the post-SOX. However, real earnings management plays the key role in earnings manipulation tools especially after SOX. We want to complement prior studies by discussing the effect of real earnings management on idiosyncratic volatility.

We extend the research period to 2010. From 2002 to 2010, two major exogenous shocks occurred. The first one is the passage of SOX in 2002, which not only improves the internal control, corporate governance, and auditor's independency but also enhances financial reporting quality remarkably. The second is the global financial crisis (GFC) from 2007 to 2010, which resulted from the overvaluing of subprime mortgages and securities and, in turn, triggered the potential liquidity risks onto the financial system. Exogenous shocks actually affect the earnings management techniques which result in the idiosyncratic risk. Previous study indicates that the managers become less conservative and change the level of earnings management after the Asia Financial Crisis in 1998 (Vichitsarawong, Eng and Meek, 2010). Therefore, this study is motivated to investigate the relationships between different earnings management techniques and the idiosyncratic risk from 2000 to 2010 to complement previous studies.

The results show that idiosyncratic risk is positively associated with both accrual-based and real earnings management without considering exogenous shocks. Moreover, idiosyncratic risk is negatively (positively) associated with accrual-based earnings management in the SOX (GFC) period and the reverse finding turns out to be true when earnings management is associated with the real earnings management. Therefore, these managers tend to switch from real earnings management techniques to accrual-based earnings management techniques.

This paper makes several contributions. First, the result shows that managers tend to switch from real earnings management to accrual-based earnings management during the GFC period. This finding signifies that managers will employ a different earnings management strategy when facing the dynamic economic changes. Zang (2012) indicates that managers will attempt to trade off accrual-based and/or real earnings management strategies based on their relative manipulation costs. This study uncovers that earnings management strategy managers trying to implement will be affected by manipulation costs. Secondly, the result notes that the higher firm-specific risk is positively associated either with accrual-based or real earnings management. Moreover, this study documents that the external economic circumstances and new

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implemented regulations do affect the relationships between earnings management and idiosyncratic risk. Finally, it is difficult to restrict managers to manipulate the real-based earnings by managing operating activities. This earlier discussion only provides a useful way to illustrate how external auditor restricts managers to manipulate earnings from real operation activities. However, our findings provide evidence from external economic circumstances that results in a relative high manipulate cost which restricts managers to manipulate earnings through the real operational activities.

1. Theoretical background and hypotheses

1.1. Earnings management and idiosyncratic risk. Prior research explores that improving information disclosure and reporting quality can mitigate information asymmetries and reduce the volatility of stock prices (Rajgopal and Venkatachalam, 2011). Kothari (2000) shows that high quality financial information can mitigate information asymmetries between managers and outside investors.

However, Dichev et al. (2013) indicate that managers have incentives to engage in earning management to avoid reporting loss, earnings declines, and earnings missing analysts' forecasts influence. Cohen et al. (2008) show that the tendency for firms to trade off real versus accrual-based earnings management activities after SOX. Chen et al. (2012) prove that the idiosyncratic return volatility is positively associated with the managerial discretion in terms of accruals. From the above discussion, this study hypothesizes that idiosyncratic risk is positively associated either with accrual-based earnings management or real earnings management practice.

H1: Idiosyncratic risk is positively associated with the earnings management.

1.2. Exogenous shock on earnings management and idiosyncratic risk. Enron scandal and the global financial crisis are two important exogenous events that shocked the U.S capital market. The former caused the investors to be more concerned about the accuracy and reliability of the accounting information. Congress passed the SOX Act to strengthen the investors' confidence and improve the accuracy and reliability of corporate disclosure (Chan et al., 2008). SOX enforcement not only strengthens the confidence of investors but also improves the accuracy and reliability of financial reporting.

Li et al. (2008) suggest that SOX has a positive effect on improving the reporting quality by constraining the earnings management and strengthening the corporate governance. Chan et al. (2008) indicate that material internal control weaknesses are positively associated with earnings management. Therefore, this study hypothesizes that the passage of SOX strengthens the internal control, restricts the earnings management and lowers the related idiosyncratic risk.

H2: Idiosyncratic risk is negatively associated with the earnings management after SOX (year 2002-2006).

The GFC is another exogenous event that shocked the U.S capital market after the Enron scandal. The GFC resulted in the potential liquidity risks in the financial system. Vichitsarawong, Eng and Meek (2010) uncover that managers were less conservative and not timely to meet the challenges during the Asian financial crisis. This study expects that GFC increases the pressure on managers which motivates them to manipulate earnings. Higher earnings management results in higher idiosyncratic risk. Thus, we develop our third hypothesis as follows:

H3: Idiosyncratic risk is positively associated with the earnings management during Global Financial Crisis period (year 2007-2010).

2. Empirical methodology

2.1. Empirical model. This study runs the regressions to investigate the effects of idiosyncratic risk on two different earnings management including accrual-based earnings management and real-based earnings management. It revises the empirical model of Rajgopal and Venkatachalam (2011) that earnings management is lagged by one year to avoid generating mere contemporaneous associations between the idiosyncratic volatility and earnings management. We construct the following model:

$$IR_{it} \cdot \alpha \cdot f(ABM_{it-1}, RBM_{it-1}, CTR_{it-1}), \quad (1)$$

where IR_{it}: the idiosyncratic risk of firm i at period t. ABM_{it-1}: the accrual-based earnings management of firm i at period t-1. RBM_{it-1}: the real-based earnings management of firm i at period t-1. CTR_{it-1}: the control variable of firm i at period t-1.

Next, this paper examines how idiosyncratic risk is affected by the earnings management after considering exogenous shocks. It uses an interactive term to proxy the influence of time periods on earnings management. The proposed model is constructed as follows:

$$IR_{it} \cdot \alpha \cdot f(ABM_{it-1}, RBM_{it-1}, TIME, ABM_{it-1} \times TIME, RBM_{it-1} \times TIME, CTR_{it-1}), \quad (2)$$

where *TIME*: the time period is categorized into *Scan, SOX and GFC*, respectively. *Scan* refers to the scandal period ranging between 2000 and 2001 and

is either equal to 1 or 0. *SOX* refers to SOX period ranging between 2002 and 2006 and is either equal to 1 or 0. *GFC* refers to the Global Financial Crisis period occurred between 2007 and 2010 and is either equal to 1 or 0.

2.2. Variable definitions. *2.2.1. Idiosyncratic risk (IR).* Idiosyncratic risk can be defined as a firm-specific risk that is affected by the operational conditions or particular events. Berrada and Hugonnier (2012) assert that the return volatility is affected by the particular events and may result in an investment risk, which is defined as an idiosyncratic risk. This research follows the study of Fu (2009) employing the Fama-French (1993, 1996) three factor model to evaluate the idiosyncratic risk. Excess return on individual stocks declines in three different ways including 1) the excess return on the board market portfolio, 2) the differences between the returns from the portfolios of small stocks and the portfolios of large stocks, and 3) the differences between the returns generated from the portfolios of low book to market stocks and portfolios of higher book to market stocks. The equation (3) and (4) are as follows:

$$R_{it} - r_t = a_i + \beta_i \left(R_{mt} - r_t \right) + s_i SMB_t + h_i HML_t + \varepsilon_{it}, \quad (3)$$

where R_{it}: the monthly stock returns of firm i at period t. R_{mt}: the monthly stock returns of the market at period t. r_t: the risk free rate at period t. *SMB*: the differences between returns from the portfolios of small stocks and portfolios of large stocks at period t. *HML*: the differences between returns from portfolios of low book to market stocks and portfolios of higher book to market stocks at period t. ε_{it}: the idiosyncratic return residual of firm i at month t, $\varepsilon_{it} \sim N\left(0, \sigma_{it}^2\right)$.

Moreover, the standard deviation of monthly idiosyncratic return residuals is transformed into the yearly idiosyncratic return residuals and present as an idiosyncratic risk (IR). Equation (4) is constructed as follows:

$$IR_{it} = Std(\varepsilon_{it}), \quad (4)$$

where IR_{it}: the idiosyncratic risk of firm i at period t.

2.2.2. Earnings management metrics. **Accrual earnings management (ABM).** This paper employs performance-matched Jones model to estimate the accrual-based earnings activities for each industry classified by the same 2-digit sic code. The revised model to estimate the accrual-based earnings management is as follows:

$$TA_{it}/A_{it\text{-}1} = \alpha(1/A_{it\text{-}1}) + \beta_1 \left(\Delta REV_{it}/A_{it\text{-}1} \right) + \\ + \beta_2 (PPE/A_{it\text{-}1}) + \varepsilon_{it}, \quad (5)$$

where TA_{it}: the total accruals of the i^{th} firm at the t^{th} period; $A_{it\text{-}1}$: the total assets of the i^{th} firm at the period (t-1); ΔREV_{it}: the changes in sales revenue of the i^{th} firm at the t^{th} period; PPE_{it}: the gross amount of the total plant assets of the i^{th} firm at the t^{th} period; ε_{it}: the error term (residual) of the i^{th} firm at the t^{th} period.

This study applies cash flow method to estimate the accrual-based earnings management:

$$TA_{it} = EBXI_{it} - OANCF_{it}, \quad (6)$$

where $EBXI_{it}$: the earnings before extraordinary items and stopped operations of the i^{th} firm at the t^{th} period; $OANCF_{it}$: the operating cash flow of the i^{th} firm at the t^{th} period.

The discretionary accrual is computed as follows:

$$NDA_{it} = \hat{\alpha}_1 (1/A_{it\text{-}1}) + \hat{\beta}_1 (\Delta REV_{it}/A_{it\text{-}1}) + \\ + \hat{\beta}_2 (PPE_{it}/A_{it\text{-}1}), \quad (7)$$

The discretionary accrual is the difference between total accrual and nondiscretionary accrual. This study constructs the equation (8) as follows:

$$ABDA_{it} = DA_{it} - AVEDA_{kjt}, \quad (8)$$

where $ABDA_{it}$: the abnormal discretionary accruals of the i^{th} firm at the tth period; DA_{it}: the discretionary accruals of the i^{th} firm at the t^{th} period; $AVEDA_{kjt}$: the average discretionary accruals of the k group in j industry at the t^{th} period.

Finally, the absolute value of performance matched discretionary accrual (*ABSABDA*) is estimated as a proxy for the reporting quality based on the accrual earnings management.

Real earnings management (RBM). Roychowdhury (2006) divides real earnings management activities into three categories, including sales manipulation, overproduction and decrease of discretionary expenditures.

Sales manipulation occurs when a manager uses the price discounts to speed up the timing of sales. Such discounts will temporarily increase the resulting sales volumes (Cohen et al., 2008). Overproduction may occur when a manager uses an overproduction method to produce more commodities than needed to meet their earnings target (Roychowdhury, 2006). A decrease of discretionary expenditures is that the managers use their discretionary power to decrease R&D expenses or SG&A expenses to raise earnings of the current period (Roychowdhury, 2006).

Following Roychowdhury (2006), this study creates normal levels for operating cash flow, production costs and discretionary expenses. The normal level of operating cash flow is the liner function of sales and the change of sales:

$$CFO_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1 (Sale_{it}/A_{it-1}) + \\ + \beta_2 (\Delta Sale_{it}/A_{it-1}) + \varepsilon_t, \quad (9)$$

where CFO_{it}: the operating cash flow of firm i at period t. $SALE_{it}$: the sales revenue of firm i at period t. $\Delta SALE_{it}$: the changes in sales revenue of firm i at period t. A_{it-1}: the total assets of firm i at period (t-1).

The abnormal cash flow generated from the company's operations is the actual cash flow from operations subtract the normal level of cash flow from operations.

Further, the production costs are defined as the sum of COGS and change in inventory during the specific year. COGS is modeled as liner functions of contemporaneous sales (Roychowdhury, 2006):

$$COGS_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \\ + \beta_1 (Sale_{it}/A_{it-1}) + \varepsilon_t, \quad (10)$$

where $COGS_{it}$: the cost of goods sold of firm i at period t.

Next, the model of inventory gross will be estimated as the liner function of contemporaneous sales and lagged change in sales:

$$\Delta INV_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1 (\Delta Sale_{it}/A_{it-1}) + \\ + \beta_2 (\Delta Sale_{it-1}/A_{it-1}) + \varepsilon_t, \quad (11)$$

where ΔINV_{it}: the change in inventory of firm i at period t. $\Delta SALE_{it-1}$: the changes in sales revenue of firm i at period t-1.

From equations (10) and (11), this study estimates the normal production costs in the following model:

$$PROD_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \beta_1 (Sale_{it}/A_{it-1}) + \\ + \beta_2 (\Delta Sale_{it}/A_{it-1}) + \beta_3 (\Delta Sale_{it-1}/_{it-1}) + \varepsilon_t, \quad (12)$$

Roychowdhury (2006) shows when the model of discretionary expenses is the linear function of the contemporaneous sales. To avoid this problem, the model of the discretionary expenses is constructed as a linear function of lagged sales as follows:

$$DISEXP_{it}/A_{it-1} = \alpha_0 + \alpha_1(1/A_{it-1}) + \\ + \beta_1 (\Delta Sale_{it-1}/A_{it-1}) + \varepsilon_t, \quad (13)$$

where $DISEXP_{it}$: the discretionary expenses of firm i at period t-1.

Further, to capture the total effect of real earnings management, the authors follow the study of Cohen and Zarowin (2010) and combine three individual variables into two comprehensive metrics of real earnings management. The first measure is *RM1* which explains the net expenses saving effect and is calculated by multiplying abnormal discretionary expenses by the negative value and then adding them to the abnormal production costs. The second one is *RM2* which explains the net operating cash flow effect and is calculated by multiplying the abnormal cash flow from operations by the abnormal discretionary expenses with the negative value and then aggregating them into one variable. Finally, the absolute values of *RM1* (*ABSRM1*) and *RM2* (*ABSRM2*) are utilized as proxies for the reporting quality based on real earnings management.

2.2.3. Control variables. The control variables included in this model are cash flow of operation (*OCF*), firm size (*Size*), financial leverage (*FL*) and operation cycle (*OPCL*), respectively. Rajgopal and Venkatachalam (2011) find that the operation performance is negatively associated with idiosyncratic volatility. For this reason, this study uses the operating cash flow scaled by total assets (*OCF*) as a proxy for operational performance. Rajgopaland and Venkatachalam (2011) support that small firms have a higher idiosyncratic volatility. The natural logarithm of total assets is used as a proxy for the firm size (*Size*). Moreover, the same study shows that the leveraged firms may have a higher probability of experiencing financial distress. Debt ratio is used as a proxy for financial leverage (*FL*). This study uses days to sell inventory plus average collection period scaled by 365 as a proxy to determine the operation cycle (*OPCL*).

2.3. Data and sample selection. This study collects the financial data from the Compustat and the stock return data from the CRSP Database. The sample consists of 3.940 firms representing 29.890 firm-year observations. The selection process and year distribution are shown in Table 1.

Table 1. Sample distribution

Panel A. Sample selection	
Calculate reporting quality process:	
Accrual earnings management total sample	58.370
Real earnings management total sample	61.270
Calculate idiosyncratic risk process:	
Idiosyncratic risk total sample	53.697
Match process:	
Match firms that have the data of accrual earnings management, real earnings management, idiosyncratic risk total sample:	32.640
Exclude financial industry	(2.750)
Final sample use to analysis:	29.890
Panel B. Sample distribution	
Year	Sample
2000	2.274
2001	2.437
2002	2.492
2003	2.482
2004	2.524
2005	2.678
2006	2.835

Table 1 (cont.). Sample distribution

Panel B. Sample distribution	
Year	Sample
2007	2.924
2008	3.090
2009	3.033
2010	3.121
Total	29.890

3. Empirical results

3.1. Descriptive statistics and correlation analysis. Table 2 Panel A provides the descriptive statistics while Panel B shows the Pearson correlation. The results in Panel A show that the percentage of operating cash flow over total asserts is around 4%. In average, financial leverage of firms is 47%, and the percentage of the operating cycle over year is 47.53%. The correlations of accrual-based earnings management and real-based earnings management are positive and, hence, demonstrate the significant correlations with the idiosyncratic risk. This finding means that earnings management has a positive effect on idiosyncratic risk in the univariate analysis.

Table 2. Descriptive statistics and Pearson correlation

Panel A. Descriptive statistics					
	P25	P50	Mean	P75	St.d
OCF	0.0212	0.0874	0.0442	0.1532	13.3210
Size	4.4906	5.9862	6.0971	7.5937	2.1862
FL	0.2913	0.4737	0.4707	0.6368	0.2216
OPCL	0.1787	0.2923	0.4753	0.4467	5.4097
ABDA	-0.1904	-0.0162	-0.0736	0.1126	5.2414
*RM*1	-0.1727	0.0365	0.0850	0.4486	11.0211
*RM*2	-0.3291	-0.0050	0.0123	0.3805	16.7986
ABSABDA	0.0486	0.1526	1.1759	0.5547	5.1083
*ABSRM*1	0.0917	0.3193	0.9935	0.8276	10.9766
*ABSRM*2	0.1298	0.3531	1.1097	0.9119	16.7619
IR(×100)	6.8153	9.9381	11.9643	14.5335	8.4014

Panel B. Pearson correlation								
	IR	ABSABDA	ABSRM1	ABSRM2	OCF	Size	FL	OPCL
IR(×100)	1							
ABSABDA	0.0421	1						
	(0.000)							
*ABSRM*1	0.0259	0.0095	1					
	(0.000)	(0.100)						
*ABSRM*2	0.0220	0.0118	0.9850	1				
	(0.000)	(0.041)	(0.000)					
OCF	-0.0181	-0.0058	-0.2243	-0.2916	1			
	(0.002)	(0.312)	(0.000)	(0.000)				
Size	-0.3923	-0.0846	-0.0225	-0.0152	0.0088	1		
	(0.000)	(0.000)	(0.000)	(0.008)	(0.129)			
FL	-0.0675	-0.0469	-0.0079	-0.0073	0.0025	0.3971	1	
	(0.000)	(0.000)	(0.174)	(0.206)	(0.660)	(0.000)		
OPCL	0.0319	0.0033	0.0009	0.0003	-0.0006	-0.0334	-0.0006	1
	(0.000)	(0.564)	(0.883)	(0.965)	(0.912)	(0.000)	(0.911)	

Notes: Variable definition: *IR* refers to the standard deviation of monthly idiosyncratic return residuals and is calculated as Fama-French three factor model; *ABSABDA* refers to the absolute value of performance match discretionary accrual; *ABSRM*1 refers an absolute value of aggregate measure of real earnings management and is calculated as the absolute value of sum of abnormal discretionary expenses multiplied by negative one and abnormal production costs; *ABSRM*2 refers an absolute value of aggregate measure of real earnings management and is calculated as the absolute value of sum of abnormal discretionary expenses multiplied by negative one and abnormal cash flow from operations multiplied by negative one; *OCF* refers to cash flow of operation and is calculated as cash flow of operation scale by total asset; *Size* refers to firm size is calculated as natural logarithm of total asset; *FL* refers to financial leverage and is calculated as debt ratio; *OPCL* refers to operation cycle and is calculated as days to sell inventory plus average collection period scaled by 365.

3.2. Multiple regression results. *3.2.1. Idiosyncratic risk on earnings management techniques.* This study runs a set of regressions of idiosyncratic risk on two different earnings management techniques. Table 3 presents the results of idiosyncratic risk on the earnings management. Model 1 (2 & 3) shows that accrual-based (real-based) earnings management has the positive and significant effect on the idiosyncratic risk, which implies that a higher magnitude of earnings management results in a higher idiosyncratic risk.

Moreover, when we add two different earnings management techniques into the regression (Models 4 & 5), the effectiveness of accrual and real earnings management remains to be constant. This result is in consistency with the hypothesis 1. However, the interesting point lies in whether exogenous shock affects the earnings management and increases the idiosyncratic risk.

Table 3. Regression result of idiosyncratic risk on earnings management techniques

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	P	Coef.	P	Coef.	P	Coef.	P	Coef.	P
OCF	-0.0095	0.002	-0.0076	0.017	-0.0078	0.017	-0.0075	0.019	-0.0077	0.018
Size	-1.6084	0.000	-1.6110	0.000	-1.6116	0.000	-1.6075	0.000	-1.6081	0.000
FL	4.5744	0.000	4.5813	0.000	4.5821	0.000	4.5736	0.000	4.5744	0.000
OPCL	0.0250	0.001	0.0250	0.001	0.0250	0.001	0.0250	0.001	0.0250	0.001
ABSABDA	0.0292	0.001					0.0292	0.001	0.0292	0.001
ABSRM1			0.0109	0.005			0.0109	0.005		
ABSRM2					0.0051	0.052			0.0050	0.053
Cons	23.9151	0.000	23.9081	0.000	23.9135	0.000	23.8924	0.000	23.8978	0.000
IND	included		included		included		included		included	
Year	included		included		included		included		included	
F-Value	170.98		170.90		170.82		168.51		168.43	
P-Value	0.000		0.000		0.000		0.000		0.000	
Adj R^2	0.267		0.267		0.267		0.267		0.267	

Notes: Variable definition: please refer to Table 2.

3.2.2. The influence of exogenous shock. **Pooled regression test.** This section begins with the analysis of a set of pooled regressions of idiosyncratic risk on the earnings management while interacting with exogenous shock (shown in Table 4). Model 1 (2 & 3) shows the effect of accrual-based (real) earnings management with the exogenous shock on idiosyncratic risk. In Model 1, accrual-based earnings management is positively and significantly associated with idiosyncratic risk. This result is consistent with the findings in Table 3. However, the main interest of this study lies in whether the earnings management affects idiosyncratic risk after considering the exogenous shocks. The result of model 1 in Table 4 shows that the relationship between idiosyncratic risk and accrual earnings management is significantly negative after the SOX period and before the GFC. The association between idiosyncratic risk and accrual earnings management is significantly positive during the GFC. This result has two following implications.

1) After the SOX and before the GFC period, the effect of accrual-based earnings management on idiosyncratic risk is negative. Zang (2012) indicates that firms facing a stricter scrutiny from the regulators and auditors have lower levels of accrual-based earnings management. This paper proves that the passage of SOX strengthens the corporate governance and auditor independence, which restricts managers to manipulate earnings.
2) In the GFC period, accrual-based earnings management is positively related to the idiosyncratic risk. It implies that the economic slump gives the pressure on the managers and induces them to manipulate accrual-based earnings. From the above discussion, this result is consistent with the hypothesis 2.

Table 4. Pooled regression result of idiosyncratic risk on earnings management techniques with exogenous shock

	Model 1		Model 2		Model 3	
	Coef.	P	Coef.	P	Coef.	P
OCF	-0.0075	0.026	-0.0474	0.000	-0.0488	0.000
Size	-0.9729	0.000	-0.9797	0.000	-0.9841	0.000
FL	-0.0001	0.677	-0.0001	0.687	-0.0001	0.687
OPCL	0.0400	0.000	0.0388	0.000	0.0395	0.000
Scan	5.7164	0.000	6.1850	0.000	6.1625	0.000
SOX	0.1386	0.253	0.2272	0.068	0.1939	0.123
GFC	1.2059	0.000	1.6799	0.000	1.6834	0.000
ABSABDA	0.0897	0.000				
ABSRM1			0.5862	0.000		
ABSRM2					0.5224	0.000
Scan_ABSABDA	0.4200	0.000				

Table 4 (cont.). Pooled regression result of idiosyncratic risk on earnings management techniques with exogenous shock

	Model 1		Model 2		Model 3	
	Coef.	P	Coef.	P	Coef.	P
SOX_ABSABDA	-0.1097	0.000				
GFC_ABSABDA	0.2101	0.001				
Scan_ABSRM1			-0.5946	0.000		
SOX_ABSRM1			-0.5359	0.000		
GFC_ABSRM1			-0.6858	0.000		
Scan_ABSRM2					-0.5287	0.000
SOX_ABSRM2					-0.4628	0.000
GFC_ABSRM2					-0.6340	0.000
IND	included		included		included	
F	1256.61		1253.65		1253.14	
Prob	0.000		0.000		0.000	
Adj R^2	0.716		0.716		0.715	

Note: Variable definition: please refer to Table 2.

In Model 2, earnings management positively relates with the idiosyncratic risk. Further, the associations between earnings management and idiosyncratic risk in both SOX and GFC period are significantly negative. The result uncovers that the effect of real earnings management on the idiosyncratic risk in the SOX is positive, but the result is reverse in terms of the GFC. The manipulation cost of real earnings management is much higher than accrual-based earnings management. The results are *not* consistent with hypotheses 2 and 3. This distinctive result may be due to the following reasons.

1) Although the passage of SOX, managers switch the earnings management method from the accrual-based into real-based (Cohen et al., 2008). Managers adopting real earnings management will certainly result in a higher idiosyncratic risk.
2) In the GFC period, economic recession induces the higher unemployment rate and the sales decline. It restricts the managers to use operational decisions to manipulate earnings. Managers may be incapable of using real earnings management to beat earnings targets. In Model 3, earnings management is positively related to idiosyncratic risk. In addition, it is negatively related to the idiosyncratic risk in both SOX and GFC periods.

In summary, idiosyncratic risk is positively associated with accrual earnings management or real earnings management. However, exogenous shock events have the different impact on the relation between earnings management and idiosyncratic risk. Given this fact, the net effect of earnings management on the idiosyncratic risk relies heavily on the regulation and the external economic circumstances.

Robustness test. Rajgopal and Venkatachalam (2011) suggest that squared method has more desirable distribution properties than the absolute value method. Therefore, the squared method is used in this study to transform the proposed earnings management variables and the result appears in Table 5. The result is similar to Table 4. The effects of accrual-based earnings management and real earnings management on the idiosyncratic risk depend on the external economic circumstances and regulations. The results support that earnings management affects firm's idiosyncratic risk.

Table 5. Pooled regression result of idiosyncratic risk on earnings management techniques with exogenous shock-squared method

	Model 1		Model 2		Model 3	
	Coef.	P	Coef.	P	Coef.	P
OCF	-0.0080	0.018	-0.0330	0.001	-0.1295	0.000
Size	-0.9777	0.000	-0.9797	0.000	-0.9769	0.000
FL	-0.0001	0.681	-0.0001	0.683	-0.0001	0.682
OPCL	0.0398	0.000	0.0396	0.000	0.0395	0.000
Scan	5.8804	0.000	5.8981	0.000	5.9005	0.000
SOX	0.0354	0.766	-0.0012	0.992	0.0033	0.978
GFC	1.3178	0.000	1.3177	0.000	1.3292	0.000
ABDAS	0.0005	0.000				
RM1S			0.0019	0.006		
RM2S					0.0080	0.000
Scan_ABDAS	0.0166	0.000				
SOX_ABDAS	-0.0008	0.004				
GFC_ABDAS	0.0048	0.076				
Scan_RM1S			-0.0019	0.006		
SOX_RM1S			-0.0018	0.008		
GFC_RM1S			-0.0037	0.022		
Scan_RM2S					-0.0080	0.000
SOX_RM2S					-0.0075	0.000
GFC_RM2S					-0.0098	0.000
IND	included		included		included	
F	1252.94		1250.06		1251.42	
Prob	0.000		0.000		0.000	
Adj R^2	0.715		0.715		0.715	

Note: Variable definition: please refer to Table 2.

Moreover, a market model is developed to calculate the standard deviation of monthly idiosyncratic

return residual as a proxy for idiosyncratic risk. The model is constructed as follows:

$$R_{it} - r_t = a_i + \beta_i \left(R_{mt} - r_t \right) + \varepsilon_{it}, \quad (14)$$

where R_{it}: the monthly stock return of firm i at period t. R_{mt}: the monthly stock return of the market at period t. r_t: the risk free rate at period t. ε_{it}: the idiosyncratic return residual of firm i at month t, $\varepsilon_{it} \sim N\left(0, \sigma_{it}^2\right)$.

Next, the monthly idiosyncratic return residual is transformed into the standard deviation of idiosyncratic return residual per year. In Table 6, idiosyncratic risk is positively associated with earnings management. The accrual-based earnings manipulation (real earnings manipulation) is significantly negatively (positively) related to idiosyncratic risk during the SOX, but the reverse result during the GFC period.

Table 6. Pooled regression result of idiosyncratic risk on earnings management techniques with exogenous shock-market model

	Model 1		Model 2		Model 3	
	Coef.	P	Coef.	P	Coef.	P
OCF	-0.0056	0.150	-0.0538	0.000	-0.0550	0.000
Size	-1.1210	0.000	-1.1277	0.000	-1.1327	0.000
FL	-0.0002	0.592	-0.0002	0.600	-0.0002	0.600
OPCL	0.0468	0.000	0.0455	0.000	0.0463	0.000
Scan	7.2401	0.000	7.6829	0.000	7.6518	0.000
SOX	0.3772	0.007	0.4717	0.001	0.4285	0.003
GFC	1.3375	0.000	1.8963	0.000	1.8886	0.000
ABSABDA	0.1053	0.000				
ABSRM1			0.7071	0.000		
ABSRM2					0.6206	0.000
Scan_ABSABDA	0.2901	0.001				
SOX_ABSABDA	-0.1414	0.000				
GFC_ABSABDA	0.2193	0.003				
Scan_ABSRM1			-0.7176	0.000		
SOX_ABSRM1			-0.6495	0.000		
GFC_ABSRM1			-0.8367	0.000		
Scan_ABSRM2					-0.6287	0.000
SOX_ABSRM2					-0.5532	0.000
GFC_ABSRM2					-0.7569	0.000
IND	included		included		included	
F	1263.56		1262.28		1261.6	
Prob	0.000		0.000		0.000	
Adj R^2	0.717		0.717		0.717	

Note: Variable definition: please refer to Table 2.

3.3. Determinants of real earnings management strategies for Global Financial Crisis. The finding shows that managers switch from real earnings management into accrual-based earnings management during the GFC period. However, the type of costs inducing the managers to switch their earnings management strategy during the GFC period remains an unaddressed question. To clarify this question, a trade-off model (two stage equation model) is employed to examine the costs and the preferences of real earnings manipulation during the GFC period. The first stage equation explains the earnings management decision, while the second one explains the costs of real operational activities.

This study uses the organizational performance (*ROA*), debt ratio (*LEV*), and company size (*SIZE*) as the proxy variables. This study also follows Cohen and Zarowin (2010) and Zang (2012) to include *SHARES* as a capital market incentive to explain why managers have an incentive to manipulate earnings. Finally, this study adds the book to market ratio (BTM) to control the firm growth opportunity. The first stage equation model is introduced as follows:

$$TEM_{it} = a_0 + a_1 ROA_{it} + a_2 LEV_{it} + a_3 SIZE_{it} + \\ + a_4 SHARE_{it\text{-}1} + a_5 BTM_{it\text{-}1} + Year + e_{it}, \quad (15)$$

where TEM_{it}: indicator variable if either of the accrual-based earnings management or real earnings management is above the industry-year median, then is equal to 1, otherwise to 0. ROA_{it}: the return on assets of firm i at period t. LEV_{it}: the financial leverage of firm i at period t measure as sum of short term and long term debt divided by average total assets. $SIZE_{it}$: the firms' size of firm i at period t measure as the nature logarithm market value.

$SHARE_{it\text{-}1}$: the shares outstanding of firm *i* at period *t*-1 measure as natural logarithm of the number of shares outstanding. $BTM_{it\text{-}1}$: the book to market ratio of firm *i* at period *t*-1.

At the second stage, the three major costs (litigation cost (*LITIGATION*), bankruptcy cost (*RZ-Score*), and market share cost (*MS*) related to real earnings management and Inverse Mill's Ratio (*IMR*) are included in this study. Cohen and Zarowin (2010) indicate that the primary penalty for earnings management is litigation. However, Kim and Park (2014) imply that the auditors can detect the real earnings management as same as accrual-based earnings management. To capture the expected litigation penalties, this study follows Cohen and Zarowin (2010) to use a dummy variable to proxy the litigation (LIT). If the firm is in high litigation industry, dummy variable is equal to 1, otherwise is equal to 0. To capture the expected firms' financial health and market share, this study follows the study of Zang (2012) to use Altman's Z-Score and market share (MS) as the costs of the real activities manipulation. The second stage equation model is as follows:

$$RBM_{it} = a_0 + a_1 LIT_{it} + a_2 RZ\text{-}Score_{it\text{-}1} + \\ + a_3 MS_{it\text{-}1} + a_4 IMR_{it} + Year + e_{it}, \quad (16)$$

where RBM_{it}: the real earnings management of firm *i* at period *t*. LIT_{it}: indicator variable if firm's sic code is 2833-2836, 8731-8734, 7371-7379, 3570-3577, 3600-3674 equals to 1 and 0, otherwise. $RZ\text{-}Score_{it\text{-}1}$: the reverse Z-Score of firm *i* at period *t*-1, where Z-Score is 03 × (NI/Assets) + 1.0 × (Sales/ Assets) + 1.4 × (Retained Earnings/Assets) + 1.2 × (Working Capital/Assets) + 0.6 × ([stock price × Share Outstanding]/Total Liabilities), moreover, multiple (-1) reverse the effect of *Z-Score*. $MS_{it\text{-}1}$: the percentage of the company's sales to the total sales of its industry of firm *i* at period *t*-1. IMR_{it}: the inverse mill's ratio of firm *i* at period *t*.

Table 7. Determinants cost of real earnings management strategies in the GFC

	RM1 > industry median		RM2 > industry median	
	Coef.	P	Coef.	P
LIT	-0.0219	0.417	-0.0636	0.019
RZ-Score	0.0135	0.233	-0.0348	0.002
MS	-0.2458	0.013	-0.2982	0.003
IMR	1.1375	0.000	1.1543	0.000
CONS	-0.0911	0.000	-0.0672	0.009
Year	included		included	
LR Chi^2	5455.49		5579.73	
Prob	0.000		0.000	
Pseudo R^2	0.261		0.267	

The first stage regression (untabulated here) shows that firm size (*SIZE*), firm performance (*ROA*), and book to market ratio (*BTM*) have a positive influence on the tendency of managing earnings. However, the focus of our study is to understand which type of costs induces managers to switch their earnings management strategy during the GFC period. The result of the second stage regression is provided in Table 7. Obviously, the market share at the beginning of the year induces managers not to manipulate earnings through real earnings management technique.

Summary and conclusions

This study follows and expands the research of Rajgopal and Venkatachalam (2011) and Chen et al. (2012) to explore the relationship between the reporting quality and idiosyncratic risk. In contrast with the studies of Rajgopal and Venkatachalam (2011) and Chen et al. (2012), this study investigates how earnings management techniques affect the associated idiosyncratic risk. Moreover, the impact of different exogenous shocks period on the earnings management technique and associated idiosyncratic risk is examined.

The results show that idiosyncratic risk is positively related to either the accrual-based or real earnings management activities. Next, we incorporate the exogenous shock events into the regression model. The results prove that the idiosyncratic risk is negatively (positively) associated with accrual earnings management during the SOX (Global Financial Crisis) period. The finding reverses as earnings management technique measured as the real earnings manipulation. Finally, the paper finds that the shirking market is the key element causing managers not to use real activity manipulation to achieve the earnings targets during the GFC period. Managers tend to switch from the real earnings management to accrual-based earnings management activities.

This research has several implications in both academic and practical. We extend the research of the reporting quality and idiosyncratic risk to examine how the different earnings management techniques affect the idiosyncratic risk. As per earlier discussion, prior research indicates that the poor reporting quality increases information asymmetry and the idiosyncratic risk. However, previous researches only examine the accrual-based earnings management. Our paper incorporates the real earnings management to make the literature more complete. We uncover that the real earnings management is positively and significantly associated with idiosyncratic risk. Moreover, this study follows the streams of research to analyze the tread-off between accrual-based earnings management

and real earnings management. Global Financial Crisis is an innate economic restriction for the managers to implement the real earnings management technique. Unfortunately, prior research ignores the effect of Global Financial Crisis. Our findings provide a critical evidence to gain more insights in this subject area.

The passage of SOX restricts managers to manipulate accrual-based earnings. Investors must pay more attention on those firms with a higher magnitude of accrual-based earnings management and real earnings management. Although regulators endeavor to improve the reporting quality after Enron scandal, no solutions can restrict managers to manipulate the real earnings management, excluding some external factors (economic recession). Therefore, we suggest that regulators should enhance the ability to detect the abnormal earnings manipulation.

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