Deviant Strategy, Internal Control, and Stock Price Crash Risk: An Empirical Study from Panel Data of A-Listed Companies in China Based on Fixed Effect Models

Jiayu Fan*, Lei Wang, Guifang Wu, Yuling Zhang
*2524636336@qq.com, 16379422@qq.com, 604801529@qq.com, 1225308907@qq.com

Accounting School, Tianjin University of Finance and Economics Pear River College, Tianjin, China

Abstract—As the growing number of listed companies over the years, stock plunge has occurred more frequently than ever before. This study examined the impacts of deviant strategy on stock price crash risk and the role of internal control between the two elements. We did the experimental analysis based on China A-listed companies over 2010–2020. STATA 17 was used to deal with data processing, fixed effect regression model and robust test. After dropping some special variables and winsorizing all the observations at the top and bottom 1%, we finally got 21039 variables. We chose six-factor model as the symbol for deviant strategy (independent variable), DIB index as the token for internal control (independent variable), and two methods to measure the risk of stock price rash risk (dependent variable). We found robust evidence that different corporate strategy is positively associated with stock price crash risk. We also found that higher levels of internal control can reduce the risk of stock price crisis. Furthermore, higher quality of internal control can alleviate the positive relationship between deviant strategy and the risk of stock price crash risk. We did robust regression model test with alternative variables, and our main models still remained tenable.

Keywords-deviant strategy; internal control; stock price crash risk; fixed effect model

1 INTRODUCTION

In the context of the continuous progress of the global economic integration process, stock price "ups and downs" occur from time to time in both domestic and foreign capital markets, especially in recent years, the occurrence of stock price crashes is gradually frequent. The stock "crash" has seriously disturbed the normal operation order of the financial market, caused investors' assets to shrink and panic, and at the same time posed a major threat to the development of listed companies. Stock price crash is a financial phenomenon in which the price of a company stock or the stock market index declines sharply without obvious signs and expectations. When the market information transparency is low, the cost to cover negative news will reduce [1]. Management will blockade negative news out of personal interest. With time goes by, numbers of negative news accumulated until finally flush into the market. Large numbers of investors will get panic and try to sell out shares in the same time, ultimately lead to share price collapse [2].

ICEMME 2022, November 18-20, Nanjing, People's Republic of China

DOI 10.4108/eai.18-11-2022.2327168

On other hand, firm-level business strategies have enormous impact on business behavior. According to the current research, the business strategy can be divided into the following three types: offensive, analytical and defensive [3]. Offensive strategies are the most responsive to change, focusing on technological innovation, new product development and new markets. The business that adopts this kind of strategy abandons original traditional company operation mode which leads the enterprise confronts huge risk. Defensive companies focus on existing products and markets, hoping to protect their market share by constantly reducing production costs by improving product quality and productivity. In this paper, we investigate whether firms with more Offensive strategies are inclined to stock price crash risk.

Internal control can reinforce the efficacy of company operations, credibility of financial statements and conformity with kinds of supervisions [5]. Effective internal control can help the operation and management of a company to be carried out under the framework legally, comprehensively control various risks and improve the rationality of enterprise decision-making. The internal control is a key factor in maintaining information transparency and reducing information asymmetry [6-7]. From this perspective, we predict that high quality internal control can reduce offensive strategies risk and then reducing agency cost.

2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The definition of stock price crash risk is the risk of an enormous plunge in stock prices due to the burst out of bad news in the financial market [1][9].

To know the influencing factors and consequences of stock price crash risk is significant since the investors could suffer great loss of fortune because of it. Jin and Myers (2006) test the relationship between information asymmetry with stakeholders and whether the relationship has the impact on stock price crash risk. Furthermore, they forecast that due to the management earning to conceal bad news, vague stocks are prone to crash. Some searchers [13] exam the assumption and prove that obscure financial report is positive related with the risk of crash. Franciset et al. (2016) prolong the study by disclosing that real earnings management as well boost the risk of crash. According to earlier research, business strategies could be classified into three categories—offensive, defensive and analytical. Offensive strategies are the most responsive to change, focusing on technological innovation, new product development and new markets. They abandon traditional company operation mode which leads the enterprise confronts huge risk. Defensive companies focus on existing products and markets, hoping to protect their market share by constantly reducing production costs by improving product quality and productivity. In this paper, we investigate whether firms with more Offensive strategies are inclined to stock price crash risk. Analytical strategies have attributes of both prospectors and defenders [3]. Based on the above discussion, we propose the following hypothesis:

Hypothesis 1 (H1): Companies with offensive strategies are more inclined to stock price crash risk.

Internal control is a key factor in modern governance mechanism. In an efficient internal control system, companies usually would be more strict in financial information quality [14], thus management have the tendency to conduct opportunistic behavior in financial strategy choice and their inclination to conceal negative information could be restrained. That could help to

reduce the risk of stock price collapse. The essence of internal control is risk assessment and risk response, therefore internal control has a substantial effect on the quality and consistency of the information system. With risk assessment and risk response, management misbehavior and fraud can be lessened. It improves the effectiveness and efficiency of management activities, credibility of financial statements, and conformity with legislations [5-6]. Therefore, companies with efficient internal control are prone to alleviate corporate financial risk, enhance financial information transparency, reduce earnings management, and maintain accounting conservatism [15-16]. Based on the above discussion, we propose the following hypothesis:

Hypothesis 2 (H2): Companies with efficient internal control are less prone to stock price crash risk.

Based on the results above, researchers have pushed studies further, they find financial misstatements could be one of the prime factors of stock price crash risk [1][13]. Companies with offensive strategies usually accompanied with higher earning expectation from stakeholders. Under the earnings pressure, management is likely to take more risky strategies to maintain financial reports looking good, such as withhold bad news. High-level internal control could restrain the management opportunistic tendency, meanwhile, it plays a significant impact on restricting earnings management, increasing the dependability of statements, and shielding the stakeholders interests [17]. Effective internal control can also enhance corporation governance and diminish agent cost. Consequently, high level internal control can improve the information transparency between stockholders and the management effectively, and regulate management behavior. Based on the above discussion, we develop the following hypothesis:

Hypothesis 3 (H3): Efficient internal control can alleviate the positive relationship between offensive strategies and the stock price crash risk.

3 DATA AND RESEARCH DESIGN

3.1 Data

We selected A-listed companies in China from 2010 to 2020. We chose 2010 as beginning because China's internal control system has been implemented in 2009. We drop the observations if the firms: (1) with trading period less than 30 weeks of current year; (2) in financial industry; (3) marked with ST or *ST, which indicating poor financial situations within at least two sequential yeas; (4) with missing values. The observations were mostly selected from CSMAR database and WIND database. We got the internal control index from the DIB database. To avoid impact of extreme values, we winsorized all the observations at the top and bottom 1%. The final sample includes 21039 firm-year observations.

3.2 Variable Measurement

3.2.1 Stock Price Crash Risk

Based on the early research [9][13][18], we used two metrics of firm-specific crash risk. First, we calculate the weekly returns of firm *i* in week *w* in year *t*:

$$R_{i,t} = \beta_0 + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{m,t+1} + \beta_5 R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

In model 1, $R_{i,t}$ is the return rate of stock i in week t, $R_{m,t}$ is the weekly value-weighted market returns in week t. After getting the residuals, which is $\varepsilon_{i,t}$, we calculated $W_{i,t}$ which is the weekly return of stock i in week t, $W_{i,t}= \ln(1 + \varepsilon_{i,t})$.

Secondly, based on $W_{i,t}$, we calculate first token of stock price crash risk:

$$NCSKEW_{i,t} = \frac{-[n(n-1)^{3/2} + \Sigma W_{i,t}^3]}{[(n-1)(n-2)(\Sigma W_{i,t}^2)]^{3/2}} \tag{2}$$

In model 2, n is the number of return in weeks in year t. The second token is the down-to-up volatility which is log of the ratio of the volatility of the down weeks versus the the up weeks (DUVOL):

$$DUVOL_{i,t} = \log\left\{\frac{[(n_u - 1)\Sigma_{Down} W_{i,t}^2]}{[(n_d - 1)\Sigma_{Up} W_{i,t}^2]}\right\} \tag{3}$$

In model 3, n_u represents the number of up weeks and n_d represents the number of down weeks. The larger NCSKEW or DUVOL is, the greater the risk of stock price crash.

3.2.2 Strategy deviance

Following earlier research [8][19], we measured this variable based on six elements: (1) advertising investment (sales expenses/sales); (2) R&D investment (net intangible assets /sales); (3) capital investment (fixed assets/number of employees); (4) fixed assets newness (net fixed assets/gross fixed assets); (5) administrative expenses investment (administrative expenses/sales); and (6) financial leverage (short-term loans, long-term loans and long-term bonds/equity). These six elements represent company strategies in different ways. In Chinese market there isn't enough disclosure for advertising and R&D expenses exclusively, we replaced advertising and R&D expenses with sales expenses and net intangible assets respectively. To construct our measure of strategic deviance, we first subtracted the mean indicator of the industry from the indicator itself. Then we standardized each strategy indicator by dividing standard deviation of itself and then obtained the absolute value of the standardized indicator. Finally, we averaged the six indicators to create a single, composite measure of strategic deviance.

3.2.3 Internal Controls

Followed the earlier research, DIB index (internal control information index) has been widely accepted among Chinese researchers. We chose DIB index to measure the internal control information quality.

3.2.4 Control Variables

Based on earlier research [9-12], we selected several control variables. The explanations of variables are as table 1:

TABLE 1. EXPLANATIONS OF VARIABLES

Variable Name	Token	Explanation
Stock Price Crash Risk	$NCSKEW_{i,t+1}$	Negative skewness of return in weeks over t + 1 years
Stock Price Crash Risk	$DUVOL_{i,t+1}$	Ln(the ratio of the standard deviations of down to up turn of weeks over t + 1 years)
Devient Strategies	STRA	As presented above
Quality of Internal Control	ICQ	Ln (DIB internal control index value)
Negative Skewness of Weekly Return	NCSKEW	NSCKET in year t
Volatility Ratio of Weekly Return	DUVOL	DUVOL in year t
Mean Returns in Weeks	Ret	Mean of returns in weeks over t years
Volatility of Return in Weeks	Sigma	Standard deviation of returns in weeks over t years
Turnover Rate	OTurnover	Mean of share turnover rate in month over year t decucts the rate of previous year t
Firm Scale	Size	Ln (total assets)
Book Value to Market Value	BM	Book value of equity/market value value of equity
Financial Leverage	Lev	Total liabilities/total assets
Rate of Return on Assets	ROA	Earnings/average assets
Property Rights of	FIRST	Largest shareholder shares/total shares
Degree of opaque information	AbsACC	Absolute the residue from the modified Jones model
Industry	IND	Industry as dummy variable
Year	YEAR	Year as dummy variable

3.3 Research Design

Firstly, based on hypotheses H1, we investigated the relationship between deviant strategy and stock price crash risk by the following model:

$$CRASH_{i,t+1} = \beta_0 + \beta_1 STRA_{i,t} + \beta_2 \Sigma Controls_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (4)$$

We took $Ncskew_{i,t+1}$ or $Duvol_{i,t+1}$ as the token for $CRASH_{i,t+1}$. $STRA_{i,t}$ represents the extent of deviant strategy in year t. $Controls_{i,t}$ includes the control variables in year t. We used Year and

Industry as fixed effects. In H1, we predict that stock price crash risk increases with the extent of deviant strategy. Thus, we assume β1 to be positive.

Secondly, based on hypotheses H2, we investigated how deviant strategy is associated with quality of internal control by the following model:

$$CRASH_{i,t+1} = \beta_0 + \beta_1 ICQ_{i,t} + \beta_2 \Sigma Controls_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (5)$$

$ICQ_{i;t}$ stands for the quality of internal control. The control variables are the same as above. In H2, we predict that stock price crash risk decreases with the quality of internal control. Thus, we assume β1 to be negative.

Thirdly, based on hypotheses H3, we used STRA*ICQ to investigate the moderating effect of internal control between STRA and stock price crash risk by the following model:

$$CRASH_{i,t+1} = \beta_0 + \beta_1 STRA_{i,t} + \beta_2 ICQ_{i,t} + \beta_3 STRA \times ICQ_{i,t} + \Sigma Controls_{i,t} + Year + Industry + \varepsilon_{i,t} \quad (6)$$

In H3, we predict that effective internal control can alleviate the positive relation between the extent of deviant strategy and the stock price crash risk. Thus, we expect β_3 to be negative.

3.4 Figures and Tables

3.4.1 Descriptive Statistics

Table2 lists the summary statistics for the variables we used from 2010-2020. The mean values of the stock price crash risk, $NCSKEW_{i,t+1}$ and $DUVOL_{i,t+1}$, are -0.314 and -0.206 respectively. Although the two measures have some tiny differences, they are in the same trend. The standard deviation of the two variables is 0.682 and 0.461 respectively which similar to previous studies. The significant standard deviation indicated that the risk of stock price crash diverse among different companies, which also indicating a nontrivial difference between two measures. The mean values of STRA is 0.469 and standard deviation is 0.248, which means companies in China tends to have relatively more offensive strategies than defensive strategies. The mean value of STRA is a little higher than p50 which means listed companies in China tends to have more offensive strategies. The mean value of ICQ is 6.493 and standard deviation is 0.117, which means companies in China have relatively high quality of internal control and there is not too much difference among different companies. That maybe because of the strict supervision or lack of enough information disclosure. The mean value of turnover rate was 0.002, the mean value of weekly return volatility was 0.062. The mean value of book-market value is 1.031 which is much higher than the value of p50(0.672). That could mean more than half of the companies may have the undervalued equity and small portion of the companies have relatively overvalued equity. The mean value of financial leverage was 0.428, which means listed companies have a relatively healthy leverage.

TABLE 2. SUMMARY STATISTICS

Variables	count	mean	sd	min	p50	max
$NCSKEW_{i,t+1}$	21039	-0.314	0.682	-2.684	-0.270	2.049
$DUVOL_{i,t+1}$	21039	-0.206	0.461	-1.498	-0.206	1.185
$STRA_t$	21039	0.469	0.248	0.117	0.407	1.887

ICQ_t	21039	6.493	0.117	5.744	6.512	6.852
$NCSKEW_t$	21039	-0.280	0.713	-2.764	-0.242	2.196
$DUVOL_t$	21039	-0.181	0.477	-1.604	-0.183	1.278
Ret_t	21039	0.002	0.009	-0.021	0.001	0.048
$Sigma_t$	21039	0.062	0.024	0.020	0.057	0.191
$OTurnover_t$	21039	-0.151	0.504	-2.531	-0.064	1.399
$Size_t$	21039	22.179	1.277	19.621	22.001	26.415
BM_t	21039	1.031	1.105	0.061	0.672	8.494
Lev_t	21039	0.428	0.204	0.036	0.422	0.887
ROA_t	21039	0.044	0.056	-0.334	0.039	0.231
$FIRST_t$	21039	0.349	0.149	0.083	0.329	0.764
$AbsACC_t$	21039	0.056	0.055	0.001	0.039	0.359

3.4.2 Empirical Results of STRA On Crash

Table 3 shows the regression results of H1. We conducted the regression with year and industry controlled. Firstly, we regressed STRA and CRASH without any controlling variables. As the column (1) and (2) show, the coefficient of STRA is 0.120 and 0.066 for the NCSKEW and DUVOL as the token for stock price crash risk respectively (t-statistics of 4.77 and 7.00), which are both positive and significant under the level of 1%. Then we conducted the regression with all the control variables. As the column (3) and (4) show, the coefficient of STRA is 0.125 and 0.066 for the NCSKEW and DUVOL respectively (t-statistics of 7.248 and 5.275), which are still both positive and significant under the level of 1%. That indicates a robust positive and significant relationship between STRA and CRASH and support H1. The positive and significant relation between STRA and CRASH imply that companies choose more deviant and offensive strategies may experience more operational uncertainty, which may lead to business failure more easily and finally to crash risk.

The coefficient of control variables NCSKEW and DUVOL are both positive and significant, which indicate that companies experienced stock price crash possibly suffer an even lower stock price. Among all the control variables, Ret (mean of weekly return) and Sigma (volatility of weekly return) describe the same company return in different ways, while the coefficients are opposite. The coefficient of Ret is positive and significant under 1%, while sigma is only statistically negative with DUVOL under 10%. That implies the company with better stock achievement is highly possibly confronted with stock price crash risk. It verified the common impression that a company with a high stock price is prone to crash.

Other control variables such as turnover rate and book to market value are both significantly negative under 1%, which indicate companies which are over-valued or with a lower turnover rate are more liable to crash. Besides, AbsACC (Degree of opaque information) is positive and significant with both CRASH proxies, which indicates that information has a positive impact on crash and the result also proved the discussion we presented above.

TABLE 3. REGRESSION RESULTS OF DEVIANT STRATEGIES AND STOCK PRICE CRASH RISK.

	(1)	(2)	(3)	(4)
Variables	$NCSKEW_{i,t+1}$	$DUVOL_{i,t=1}$	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$
$STRA_t$	0.120^{***}	0.066^{***}	0.125^{***}	0.066^{***}
	(6.887)	(5.201)	(7.248)	(5.275)

$NCSKEW_t$			0.079^{***}	
			(11.387)	
$DUVOL_t$				0.066^{***}
				(9.608)
Ret_t			12.326^{***}	8.254^{***}
			(15.477)	(14.971)
$Sigma_t$			-0.209	-0.433^{*}
			(-0.631)	(-1.944)
$OTurnover_t$			-0.062^{***}	-0.042^{***}
			(-5.751)	(-5.757)
$Size_t$			0.005	-0.010^{***}
			(0.792)	(-2.676)
BM_t			-0.048^{***}	-0.023^{***}
			(-6.731)	(-5.082)
Lev_t			-0.010	-0.024
			(-0.324)	(-1.119)
ROA_t			0.309^{***}	0.150^{**}
			(3.219)	(2.321)
$FIRST_t$			-0.083^{**}	-0.047^{**}
			(-2.520)	(-2.131)
$AbsACC_t$			0.295^{***}	0.177^{***}
			(3.400)	(2.980)
_cons	-0.248^{***}	-0.164^{***}	-0.385^{***}	0.061
	(-5.740)	(-5.646)	(-2.906)	(0.677)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	21039	21039	21039	21039
adj. R^2	0.044	0.049	0.072	0.074

t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

3.4.3Empirical Results of ICQ On Crash

Table 4 shows the regression results of H2. We conducted the regression with year and industry controlled. As the column (1) and (2) show, the coefficient of ICQ is -0.153 and -0.106 for the NCSKEW and DUVOL respectively (t-statistics of -3.55 and -3.55), which are both negative and significant under the level of 1%. That indicates companies with a higher level of internal control are less prone to crash. This regression result supports H2.

TABLE 4. REGRESSION RESULTS OF DEVIANT STRATEGIES AND STOCK PRICE CRASH RISK

	(1)	(2)
Variables	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$
ICQ_t	-0.153^{***}	-0.106^{***}
	(-3.550)	(-3.550)
$NCSKEW_t$	0.079^{***}	

	(11.391)	
$DUVOL_t$		0.066***
		(9.630)
Ret_t	12.527***	8.386***
	(15.694)	(15.195)
$Sigma_t$	-0.151	-0.405*
	(-0.456)	(-1.817)
$OTurnover_t$	-0.062***	-0.042***
	(-5.804)	(-5.815)
$Size_t$	0.007	-0.008**
	(1.269)	(-2.108)
BM_t	-0.047***	-0.023***
	(-6.557)	(-4.928)
Lev_t	-0.017	-0.028
	(-0.536)	(-1.302)
ROA_t	0.370***	0.201***
	(3.682)	(2.965)
$FIRST_t$	-0.081**	-0.045**
	(-2.448)	(-2.042)
$AbsACC_t$	0.338***	0.202***
	(3.892)	(3.398)
_cons	0.618**	0.739***
	(2.141)	(3.725)
Industry	Yes	Yes
Year	Yes	Yes
N	21039	21039
adj. R^2	0.070	0.074

t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

3.4.4 Empirical Results of Moderating Influence Of ICQ On The Relationship Between STRA And CRASH

Table 5 shows the regression results of H3. We conducted the regression with year and industry controlled. As the column (1) and (2) show, the coefficient of STRA_ICQ is -0.65 and -0.408 for the NCSKEW and DUVOL respectively (t-statistics of -4.931 and -4.163), which are both negative and significant under the level of 1%. That indicates companies with a higher level of internal control are less prone to crash. High quality of internal control ensures the effectiveness and efficiency of management activities, reliability of financial reporting, and compliance with laws and regulations, finally reduce the stock price crash risk. The results suggested that the positive relationship between deviant strategy and the risk of stock price crash risk can be alleviated by improving the internal control. This regression result supports H3.

TABLE 5. REGRESSION RESULTS OF MODERATING INFLUENCE OF ICQ ON THE RELATIONSHIP BETWEEN STRA AND CRASH

	(1)	(2)
Variables	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$
$STRA_t$	4.331***	2.703***
	(5.075)	(4.262)
ICQ_t	0.168**	0.094*
	(2.187)	(1.713)

$STRA\_ICQ_t$	-0.650***	-0.408***
	(-4.931)	(-4.163)
$NCSKEW_t$	0.079***	
	(11.342)	
$DUVOL_t$		0.066***
		(9.590)
Ret_t	12.425***	8.327***
	(15.591)	(15.095)
$Sigma_t$	-0.227	-0.444**
	(-0.685)	(-1.994)
$OTurnover_t$	-0.062***	-0.042***
	(-5.787)	(-5.797)
$Size_t$	0.008	-0.008**
	(1.320)	(-2.072)
BM_t	-0.047***	-0.023***
	(-6.584)	(-4.928)
Lev_t	-0.011	-0.025
	(-0.346)	(-1.149)
ROA_t	0.446***	0.244***
	(4.449)	(3.600)
$FIRST_t$	-0.076**	-0.043*
	(-2.313)	(-1.925)
$AbsACC_t$	0.305***	0.184***
	(3.515)	(3.098)
_cons	-1.539***	-0.599*
	(-3.062)	(-1.660)
Industry	Yes	Yes
Year	Yes	Yes
N	21039	21039
adj. R^2	0.073	0.075

t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

3.5 Robust Tests

3.5.1 Alternative Variable for CRASH

Following the earlier research [13], we constructed a dummy variable F_Crash to test our main model as following:

$$F\_CRASH_{i,t+1} = 1[\exists t, W_{J,T} \le Average(W_{j,t}) - 3.09\sigma_{j,t}] \tag{7}$$

Table 6 shows the regression results after we used the dummy variable F_Crash. As column (3) showing, the coefficient of STRA is 9.35 (t-statistics of 2.307), which is positive and significant under the level of 5%. The coefficient of STRA_ICQ is -1.419 (t-statistics of -2.261), which is both negative and significant under the level of 5%. This regression result supports our main model.

TABLE 6. REGRESSION RESULTS OF ALTERNATIVE CRASH

	(1)	(2)	(3)
Variables	$F\_Crash_{i,t+1}$	$F\_Crash_{i,t+1}$	$F\_Crash_{i,t+1}$

$STRA_t$	0.194**		9.350**
	(2.178)		(2.307)
ICQ_t		-0.437**	0.279
		(-2.043)	(0.747)
$STRA\_ICQ_t$			-1.419**
			(-2.261)
$Crash_t$	0.023	0.019	0.021
	(0.322)	(0.257)	(0.290)
Ret_t	14.146***	14.595***	14.359***
	(3.205)	(3.304)	(3.259)
$Sigma_t$	-4.533***	-4.440***	-4.548***
	(-2.675)	(-2.626)	(-2.688)
$OTurnover_t$	-0.123**	-0.125**	-0.124**
	(-2.519)	(-2.557)	(-2.546)
$Size_t$	-0.173***	-0.165***	-0.165***
	(-5.330)	(-5.034)	(-5.034)
BM_t	-0.027	-0.024	-0.023
	(-0.645)	(-0.586)	(-0.549)
Lev_t	0.189	0.176	0.183
	(1.161)	(1.079)	(1.126)
ROA_t	-0.380	-0.146	0.006
	(-0.807)	(-0.294)	(0.012)
$FIRST_t$	-0.083	-0.075	-0.065
	(-0.494)	(-0.445)	(-0.390)
$AbsACC_t$	1.045**	1.138**	1.077**
	(2.340)	(2.546)	(2.407)
_cons	1.458**	4.241***	-0.515
	(1.978)	(2.853)	(-0.209)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	21039	21039	21039
pseudo R^2	0.025	0.025	0.026

t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

3.5.2 Alternative Variable for STRA

The variable STRA was constructed by six elements. Among them, we replaced advertising and R&D expense by sales expense and net intangible assets respectively, while this substitution may not be reasonable. According to Tang et al. (2011), we excluded these two elements which are advertising investment (sales expenses/sales) and R&D investment (net intangible assets /sales), and built an alternative variable STRA2 based on the rest four elements (capital investment, fixed assets newness, administrative expenses investment, and financial leverage).

Table 7 shows the regression results after we used the variable STRA2. As column (3) and (4) showing, the coefficient of STRA2 is 2.511 and 1.717 for the NCSKEW and DUVOL respectively (t-statistics of 3.637 and 3.582), which are both positive and significant under the level of 1%. The coefficient of STRA2_ICQ is -0.381 and -0.262 for the NCSKEW and DUVOL respectively (t-statistics of -3.577 and -3.577), which are both negative and significant under the level of 1%. This regression result supports our main model.

TABLE 7. REGRESSION RESULTS OF ALTERNATIVE CRASH

	(1)	(2)	(3)	(4)
Variables	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$
$STRA2_t$	0.047***	0.023**	2.511***	1.717***
	(3.490)	(2.384)	(3.637)	(3.582)
ICQ_t			0.026	0.017
			(0.404)	(0.373)
$STRA2\_ICQ_t$			-0.381***	-0.262***
			(-3.577)	(-3.542)
$NCSKEW_t$	0.079***		0.079***	
	(11.411)		(11.356)	
$DUVOL_t$		0.066***		0.066***
		(9.639)		(9.617)
Ret_t	12.360***	8.273***	12.493***	8.367***
	(15.508)	(15.002)	(15.661)	(15.164)
$Sigma_t$	-0.168	-0.411*	-0.175	-0.414*
	(-0.509)	(-1.842)	(-0.529)	(-1.858)
$OTurnover_t$	-0.062***	-0.042***	-0.062***	-0.042***
	(-5.729)	(-5.740)	(-5.776)	(-5.787)
$Size_t$	0.004	-0.011***	0.008	-0.008**
	(0.692)	(-2.752)	(1.314)	(-2.056)
BM_t	-0.048***	-0.023***	-0.046***	-0.023***
	(-6.690)	(-5.048)	(-6.547)	(-4.892)
Lev_t	-0.016	-0.027	-0.019	-0.029
	(-0.512)	(-1.261)	(-0.609)	(-1.360)
ROA_t	0.280***	0.134**	0.408***	0.222***
	(2.907)	(2.065)	(4.052)	(3.284)
$FIRST_t$	-0.085***	-0.048**	-0.079**	-0.044**
	(-2.593)	(-2.189)	(-2.405)	(-1.997)
$AbsACC_t$	0.309***	0.185***	0.324***	0.196***
	(3.549)	(3.109)	(3.725)	(3.284)
_cons	-0.325**	0.093	-0.572	-0.070
	(-2.462)	(1.041)	(-1.349)	(-0.239)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	21039	21039	21039	21039
adj. R^2	0.070	0.073	0.071	0.074

t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

3.5.3Alternative Variable for ICQ

To test robustness of the main model one step further, we built an alternative variable for ICQ. Based on DIB database, we constructed a dummy variable ICQ2. We set ICQ2=0 if the company had internal control deficiency in year t and ICQ2=1 if not.

Table 8 shows the regression results after we used the variable ICQ2. As column (3) and (4) showing, the coefficient of ICQ2 is -0.036 and -0.019 for the NCSKEW and DUVOL respectively (t-statistics of 8.25 and 6.341), which are both negative and significant under the level of 1%. The coefficient of STRA_ICQ2 is -0.015 and -0.009 for the NCSKEW and DUVOL respectively (t-statistics of -4.594 and -3.744), which are both negative and significant under the level of 1%. This regression result supports our main model one more time, and also proved that

internal control plays an important part in a alleviating the positive relationship between deviant strategy and the risk of stock price crash risk

TABLE 8. REGRESSION RESULTS OF ALTERNATIVE ICQ

	(1)	(2)	(3)	(4)
Variables	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$	$NCSKEW_{i,t+1}$	$DUVOL_{i,t+1}$
$STRA_t$			0.236***	0.135***
			(8.250)	(6.341)
$ICQ2_t$	-0.035***	-0.018**	-0.036***	-0.019***
	(-3.165)	(-2.488)	(-3.282)	(-2.587)
$STRA\_ICQ2_t$			-0.015***	-0.009***
			(-4.594)	(-3.744)
$NCSKEW_t$	0.081***		0.080***	
	(11.199)		(11.147)	
$DUVOL_t$		0.065***		0.065***
		(9.238)		(9.183)
Ret_t	12.397***	8.342***	12.355***	8.318***
	(15.191)	(14.777)	(15.161)	(14.744)
$Sigma_t$	0.084	-0.288	0.017	-0.324
	(0.246)	(-1.259)	(0.051)	(-1.415)
$OTurnover_t$	-0.060***	-0.041***	-0.060***	-0.041***
	(-5.446)	(-5.532)	(-5.485)	(-5.566)
$Size_t$	0.000	-0.013***	0.001	-0.013***
	(0.007)	(-3.314)	(0.186)	(-3.164)
BM_t	-0.044***	-0.020***	-0.045***	-0.021***
	(-6.066)	(-4.307)	(-6.137)	(-4.354)
Lev_t	-0.009	-0.026	0.002	-0.019
	(-0.279)	(-1.143)	(0.065)	(-0.853)
ROA_t	0.268***	0.135**	0.323***	0.165**
	(2.721)	(2.038)	(3.285)	(2.490)
$FIRST_t$	-0.094***	-0.059***	-0.089***	-0.057**
	(-2.740)	(-2.576)	(-2.605)	(-2.461)
$AbsACC_t$	0.321***	0.210***	0.298***	0.198***
	(3.565)	(3.397)	(3.316)	(3.204)
_cons	-0.182	0.185**	-0.288**	0.127
	(-1.311)	(1.967)	(-2.059)	(1.338)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	19621	19621	19621	19621
adj. R^2	0.071	0.075	0.074	0.077

t statistics in parentheses, * p < 0.1, ** p < 0.05, *** p < 0.01

4 CONCLUSIONS

With a growing number of listed companies, stock price crash occurs more frequently than ever before. Once the crash happened, the stock plunged and thousands of investors would be confronted with a tremendous loss of fortune. Thus, it is vital to explore the potential determinants to the phenomenon. Researchers have found that, information opaqueness, earnings management, management opportunistic incentive, and equity incentives, could

contribute to the crash. All these could be the results of business strategies. Could the various extent of deviant strategy have the different impact on crash? What is the role of internal control between the two factors? Based on these queries, we conducted a series of model to test relation among the three factors and got the conclusions as follows:

Firstly, there is a positive and significant relation between deviant strategy and stock price crash risk. This result is valid no matter we test the relation between the two factors alone or considering the controls. Our findings indicated that imply that companies choose more deviant and offensive strategies may experience more operational uncertainty, which may lead to business failure more easily and finally to crash risk.

Secondly, internal control has a negative and significant effect on stock price crash risk. This result is valid no matter we test the relation between the two factors alone or considering the controls. Our findings suggested that companies with high quality internal control are unlikely to crash. Furthermore. Meanwhile, higher quality of internal control can alleviate the positive relationship between deviant strategy and the risk of stock price crash risk.

Acknowledgement. This research is supported by Tianjin Finance Bureau and Tianjin Accounting Association (Q210501), and Tianjin University of Finance and Economics Pear River College (ZJZD20-02).

REFERENCES

[1] Jin, L., and S. C. Myers., R2 around the world: New theory and new tests, Journal of Financial Economics, vol. 79 (2), pp. 257–92, 2006.

[2] X. Chang, Y. Chen, and L. Zolotoy., Stock liquidity and stock price crash risk, Journal of Financial and Quantitative Analysis, vol. 52 (4), pp. 1605–37, 2017.

[3] R.E Miles., C.C. Snow,A.D. Meyer, Organizational Strategy, Structure, and Process. Academy of Management Review, pp. 546-562, 1978.

[4] R.E. Houmes, T.R. Skantz, Highly valued equity and discretionary accruals. J. Bus. Finance Account, vol. 37 (1–2), pp. 60–92, 2010.

[5] Arping, S., and Z. Sautner., Did SOX Section 404 make firms less opaque? Evidence from cross-listed firms. Contemporary Accounting Research, vol. 30 (3), pp. 1133–65. 2013.

[6] C.Chen, J. B. Kim, and L. Yao., Earnings smoothing: Does it exacerbate or constrain stock price crash risk?, Journal of Corporate Finance, vol. 42 (1), pp. 36–54, 2017.

[7] M.Feng, C.Li, S.E. McVay, H. Skaife, Does ineffective internal control over financial reporting affect a firm's operations? Evidence from firms' inventory management, The Accounting Review, vol. 90 (2), pp. 529–557, 2015.

[8] J. Tang, M. Crossan, W. Rowe, Dominant CEO, Deviant Strategy, and Extreme Performance Vriables and Accounting Information: The Case of the Airline Industry, Journal of Accounting and Public Policy, vol. 22(3), pp. 231-254, 2003.

[9] J.B. Kim, Y. Li, L. Zhang, CFOs versus CEOs: Equity Incentives and Crashes, J. Financ. Econ., vol. 101, pp. 713–730, 2011.

[10] M. Defond, M. Hung, S. Li, Does Mandatory IFRS Adoption Affect Crash Risk, Account. Rev, vol. 90, pp. 265–299, 2015,

[11] J.D.Piotroski, T.J.Wong, T. Zhang, Political Incentives to Suppress Negative Information: Evidence from China Listed Firms, J. Account. Res, vol. 53, pp. 405–459, 2015

[12] Y.C.Lin, Y.C.Wang, J.R. Chiou, H.W. Huang, CEO Characteristics and Internal Control Quality, Corp. Gov. Int. Rev, vol. 22, pp. 24–42, 2014
[13] A.P. Hutton, A.J. Marcus, H.Tehranian, Opaque financial reports, R2, and crash risk., J. Financ. Econ., vol. 94 (1), pp. 67–86, 2009.
[14] S.Mitra, B. Jaggi, and M. Hossain., Internal Control Weaknesses and Accounting Conservatism: Evidence from the Post-Sarbanes-Oxley Period, Journal of Accounting, Auditing & Finance, vol. 28 (2), pp. 152–191, 2013.
[15] H.Ashbaugh-Skaife, D.W.Collins, W.R.Kinney, R.LaFond, The Effect of SOX Internal Control Deficiencies and Their Remediation on Accrual Quality, Account. Rev, vol. 83, pp. 217–250, 2008.
[16] B.W.Goh, D. Li, Internal controls and conditional conservatism,The Accounting Review, vol. 86 (3), pp. 975–1005, 2011.
[17] Z.Singer, H. You, The Effect of Section 404 of the Sarbanes-Oxley Act on Earnings Quality, Journal of Accounting, Auditing and Finance, vol. 26(3), 2011.
[18] N.H.Xu, X.R.Li, Q.B.Yuan, Excess Perks and Stock Price Crash Risk: Evidence from China, J. Corp. Financ, vol. 25, pp. 419–434, 2014.
[19] M.A.Geletkanycz, D.C.Hambrick, The external ties of top executives: implications for strategic choice and performance, Administrative Science Quarterly, vol. 42, pp. 654–81, 1997.