






“Business strategy and stock price crash risk: The mediating role of financial constraints”

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BUSINESS STRATEGY AND STOCK PRICE CRASH RISK: THE MEDIATING ROLE OF FINANCIAL CONSTRAINTS

Abstract

The global financial crisis increased uncertainty in economic policy. Firms manage challenges through business strategies and financial constraints and deal with crash risk more proactively to overcome these impediments. This paper investigates the mediating role of financial constraints in the association between business strategy and crash risk, and the type of business strategy that influenced crash risk in Egyptian firms from 2014 to 2021. Data were obtained from financial statements and reports available in the Thomson Reuters database. A total of 792 observations were collected, representing 99 Egyptian firms. The statistical techniques employed in the analysis included ordinary least squares, modified least squares, and path analysis. The results indicate that a higher financial constraint ratio increases crash risk and has a mediating effect on business strategy and crash risk. Results show a positive impact of prospector strategy on crash risk using OLS and GLS, in line with the bad news hoarding hypothesis. Further research shows that prospector strategies have a positive effect on financial constraints. Egyptian firms have higher levels of information asymmetry, which leads to adopting a prospector business strategy and exerts a more pronounced positive influence on the likelihood of crash risk. A robustness check confirms the positive effect of financial constraints as a mediator variable on the relationship between prospector business strategy and crash risk.

Keywords

business strategy, financial constraints, stock price crash risk, prospector strategy, defender strategy

JEL Classification

G39, M41, G50

INTRODUCTION

Crash risk (SPCR) is an important and critical element related to stock prices and their returns for not only firms but also their stakeholders, who are concerned with aspects such as the creditworthiness, sustainability, and prospects of these organizations. These stakeholders primarily include existing and potential shareholders, lenders, suppliers, and customers (Liu et al., 2023; Saleem et al., 2018; Hosseinzadeh Zorofchi et al., 2021; He & Ren, 2022; Safi et al., 2022). SPCR is a significant decline in stock value and a reduction in shareholders' wealth (Luo et al., 2023). Crash risk is highly concerning to both firms and their investors because it influences risk management and investment decision-making (Habib & Hasan, 2017; Wang et al., 2021; Bae et al., 2021; Fu et al., 2021; Garg et al., 2022; Feng et al., 2022; Yuan et al., 2022).

Most of the literature suggests that the essential determinate of SPCR is managers' propensity to hide unfavorable information from stakeholders and subsequent disclosure of this accumulated information, in particular when agency costs arise, followed by a decrease in the market value (Zhou et al., 2023; Dang et al., 2018; Razmian et al., 2020; Hosseinzadeh Zorofchi et al., 2021).

Business strategy is the most significant driver for determining SPCR in recent times. Firms have different classifications of business strategies and have different characteristics. Jia (2018) shows that some firms continually update themselves and look for new development sources by investing in innovation due to the competitive business environment where the speed of change is accelerating (prospectors). While other companies prioritize cost leadership and concentrate on manufacturing and sales within certain markets (Lin, 2023; Safi et al., 2022; Li et al., 2022; Razmian et al., 2020). Financial constraints are the main obstacle to corporate innovation. Consequently, the results show that greater financial constraints suppress the positive role of business strategy in reducing SPCR. Therefore, firms cannot gain technological superiority or implement competitive strategies (Hall & Lerner, 2010). Also, the type of strategy determines the degree of mitigation of crash risk for firms with strong financial constraints.

Contradictory evidence has been produced by the majority of studies, mainly in well-established institutional settings. But there are still large research gaps in certain contexts where firms following prospectors are more susceptible to SPCR than defenders (Safi et al., 2022; Habib & Hasan, 2017; Hosseinzadeh Zorofchi et al., 2021), although some firms follow the defender business strategy in case it is not possible to implement a prospector business strategy (Hosseinzadeh Zorofchi et al., 2021). Also, the prospector business strategy does not increase financial opacity in case of higher financial constraints and increases their production demand. However, the defender business strategy minimizes financial opacity in case of lower financial constraints and decreases its production demand (Chin, 2023). This study examines the mediating role of financial constraints on the relationship between business strategy and crash risk in Egyptian firms.

1. LITERATURE REVIEW

Most SPCR literature is based on bad news hoarding theory, in which both financial and non-financial motives for managers play an important role in opportunistically accumulating and hiding bad news in the firm. There are more reasons, like managers' concerns regarding the effect of bad news on their future careers and compensation motivators (Habib & Hasan, 2017; Razmian et al., 2020; Hosseinzadeh Zorofchi et al., 2021).

Good implementation of business strategy plays a significant role in achieving firm competitive advantages. Additionally, the strategy choice of firms will have a direct impact on their various economic behaviors (Ye et al., 2023; Li et al., 2022; Safi et al., 2022). Therefore, the business strategy is one of the factors influencing the level of crash risk at the corporate level (Arianwuri et al., 2017; Habib & Hasan, 2017).

There are two different types of business strategies that can affect a firm's opportunity to face SPCR, namely, prospectors' and defenders' strategies (Richardson et al., 2023; Habib & Hasan, 2017; Saleem et al., 2018; Razmian et al., 2020; Hosseinzadeh Zorofchi et al., 2021; Safi et al., 2022).

The literature argues that different types of business strategies have different characteristics. Hence, the prospector strategy fits innovative firms. These firms need to support creativity and flexibility because they are trying to take advantage of profitable opportunities and competition. In the given context, prioritizing investment in R&D holds greater significance than emphasizing efficiency, so the firm implementing the prospector business strategy is more likely to face higher uncertainty risks (Arianwuri et al., 2017; Razmian et al., 2020).

The firm's prospector strategy focuses on opening up new markets and continuously producing a unique product range. The use of a decentralized organizational structure can result in several outcomes, including staff turnover, increased uncertainty, diminished profitability, potential challenges in future cash flow earning capacity, and a high degree of volatility in cash flow and financial constraints (Cen, 2023; Li et al., 2022).

In addition, prospector firms have significant levels of uncertainty (Ryu, 2021). Prospectors encounter a higher degree of information asymmetry, which can lead to increased financial constraints (Razmian et al., 2020). For this reason, the occurrence of untimely disclosure of negative in-

formation may be attributed to managerial strategies aimed at postponing the dissemination of such news, which can ultimately result in the occurrence of SPCR (Arianwuri et al., 2017; Xu et al., 2023). Consequentially, the prospector strategy is more prone to crash risk (Habib & Hasan, 2017).

Safi et al. (2022) argue that prospectors (innovation-oriented) may choose to allocate their investments towards ventures that carry a greater degree of risk for higher gains or to potentially exploit opportunities for irregularity and dissemination of misleading information. Also, Arianwuri et al. (2017) indicate that management tends to delay the bad news related to prospector strategy, making them more vulnerable to the SPCR.

Habib and Hasan (2017) argued that firms that use innovative strategies are more likely to encounter overvaluation of their equity, which raises SPCR. Also, Saleem et al. (2018) indicate that innovative strategies have a higher probability of facing SPCR and are helpful for investors in allocating assets cautiously among firms with diverse strategies. The literature argues that the relationship between innovation and SPCR is different between developed and emerging markets, specifically firms with weak supervision and that the influence of corporate disclosure innovation strategies on SPCR is more pronounced (Zhang et al., 2021).

Weber and Müßig (2022) argued that prospectors are more likely to disclose their risk factors in the annual report because they choose a business strategy that is inherently riskier and exposes them to high uncertainty risks (Habib et al., 2023).

Safi et al. (2022) stated that their findings should not be interpreted as a suggestion for firms to avoid adopting prospector strategies. The authors recommend that firms, policymakers, and regulators focus their efforts on setting up a mechanism, such as implementing a conservative accounting policy that can mitigate information asymmetry, which will help mitigate the negative impact of a prospector business strategy on SPCR.

Firms should motivate managers to use prospector strategies as they are innovation-based, which is a crucial source of a firm's quick growth. Firms should manage the adverse consequences of pros-

pector strategies and adopt innovation-based strategies to improve their growth (Safi et al., 2022).

Indeed, the firm's innovation-oriented strategy (prospector) performs more to safeguard the environment than those that follow defender strategies and is particularly pronounced in state-owned businesses, heavy-polluting industries, and firms located in areas with strict environmental regulations (Kong et al., 2019; Yuan et al., 2020).

Defender-type firms exhibit contrasting qualities to prospector firms. These firms typically focus on a narrow range of specific products and services, displaying little innovation regarding new product development and market expansion. As a result, their growth tends to be gradual and consistent, in contrast to the more dynamic and rapid expansion observed in prospector firms.

Defender-type firms adhere to an efficiency-oriented strategic approach characterized by reduced investment in R&D, limited staff turnover, a stable organizational structure, decreased exposure to uncertainty, strong profitability, few financial constraints, and the capacity to generate future cash flow (Li et al., 2022). Subsequently, the defender strategy has no significant effect on the SPCR since the defender strategy concentrates on market stability for the long term, which limits the product types produced by the firm, so the probability of SPCR is low (Arianwuri et al., 2017).

Financial constraints are frictions that prevent firms from funding desired and profitable investments and cause firms to face severe stock price volatility, which results from a lack of access to resources such as credit constraints, dependency on bank loans, and the inability to borrow or issue shares (Bea et al., 2021). Thus, financially constrained firms are more likely to have a higher likelihood of SPCR (Bea et al., 2021).

Gao and Li (2021) and Bea et al. (2021) argued that the financial constraints on firms that result from monetary policy are closely associated with significant information asymmetry, bad company reputation, and short-term oriented strategy operation. Hence, a firm is more susceptible to SPCR due to its high cash flow uncertainty and financial constraints (Choi & Park, 2022).

In addition, He and Ren (2022) find strong evidence that financially constrained firms have strong incentives to suppress bad news for an extended period to seek external financing and are more likely to have SPCR when they default. As suppressed unfavorable news accumulates, stock prices become increasingly overpriced, resulting in a higher likelihood of future SPCR.

Financially constrained firms often have more anomalous accruals and default risk than unconstrained firms. These two factors could collectively or individually contribute to the favorable effect of financial constraints on future SPCR, which is stronger for firms with inadequate corporate governance. On the other hand, to lower SPCR, it is vital for financially constrained firms that have solid corporate governance to boost creditworthiness as well as information availability to the public (He & Ren, 2022).

SPCR is less likely when firms face higher financial constraints (He & Ren, 2022). Indeed, firms that adopt a prospector's strategy offer much more trade credit to their customers than those that adopt a defender's strategy (Cao et al., 2022).

Zhou and Pan (2018) discovered that corporate innovation can successfully mitigate the SPCR, particularly in companies that experience significant financial constraints and when there is uncertainty over information transparency. This implies that when firms plan to implement CSR investments for strategic purposes, they should first secure their financial stability (Bea et al., 2021), which results from the disclosure of R&D activities promotes firms' reputation, represents management teams' confidence, and motivates the success of innovation, eventually facilitating stockholders' assurance and credit loan possibilities from commercial banks (Zhang et al., 2021).

Financial stability and preventing systemic risk in the capital market has become a significant problem in the face of heightened concerns about the effective regulation of financial risk.

Financial stability and preventing systemic risk in the capital market have become significant problems in the face of heightened concerns about the effective regulation of financial risk (Zhou & Pan,

2018). Furthermore, Kong et al. (2019) observed that when financial constraints or earning management are significant, prospectors engage in more environmental actions than defenders.

Prospectors with a high degree of financial constraints participate in more environmental activities than defenders because financial constraints significantly limit the firms' investments in intangibles for R&D, design, software, and any process improvements. Although innovative firms tend to invest more in intangibles, there is no difference between innovative and efficient firms in the role that financial constraints play in limiting growth.

Based on the previously mentioned literature review and its supporting arguments, firms following prospectors are more susceptible to SPCR than defenders because prospectors follow aggressive strategies and are more prone to SPCR than defenders who follow conservative strategies (Safi et al., 2022; Habib & Hasan, 2017; Hosseinzadeh Zorofchi et al., 2021). Also, managers are advised to pay extra attention to SPCR if they implement the prospector strategies, and if it is not possible to have a more prospector business strategy, they should follow the defender business strategy (Hosseinzadeh Zorofchi et al., 2021). Financial constraints reduce firms' investments in intangibles, but the strength of this effect is the same in motivating and training their possible innovative use by efficiency and innovative firms (Montesor & Vezzani, 2022). Hence, a high level of business diversification is particularly effective for firms that suffer from financial constraints (Ellouze & Mnasri, 2020; Kabbach-de-Castro et al., 2022).

The listed firm with financial constraints cannot earn technological superiority when competing firms face higher SPCR and no ability to implement competitive strategies (Hall & Lerner, 2010; Zhou & Zhang, 2023). Furthermore, prospectors do not increase financial opacity by smoothing earnings, especially when they face higher financial constraints and grow their production demand. However, defenders minimize financial opacity through loss avoidance and increase it through aggressive earnings, especially when they face lower financial constraints and a decline in their production demand (Chin, 2023). According to these arguments, firms that implement either of

the two business strategies have greater financial performance and, thus, a lower bankruptcy rate. In light of the above illustration, the present study develops several hypotheses.

This study aims to explore the effect of business strategy on SPCR, the extent to which business strategy is affected by the degree of financial constraints (FC) and investigate the effect of financial constraints on SPCR. The following hypotheses for empirical testing are proposed:

H_1 : *Prospector business strategy has a positive effect on SPCR.*

H_2 : *Financial constraints have a positive effect on SPCR.*

H_3 : *Business strategy has a positive effect on financial constraints.*

H_4 : *There is a positive relationship between business strategy and SPCR with the mediating role of financial constraints.*

2. DATA & METHODOLOGY

2.1. Data

The study sample consists of 99 Egyptian firms included in the EGX100 index from 2014 to 2021, for a total of 792 observations. The financial sector was excluded from the sample due to its unique characteristics compared to other sectors. This study utilizes ordinary least squares (OLS) regression and path analysis techniques using financial statements and reports.

Table 1 summarizes the sectors listed on the EGX100, excluding the financial sector. The data shows that the majority of the sample is from both the real estate and food sectors, at 19.19%. The construction sector follows with a percentage of 16.16%, and the industrial sector comes next with approximately 10.10%. On the other hand, the healthcare, oil, and retail sectors represent a small portion of the sample at 1.01%, 2.02%, and 2.02%, respectively. According to the business strategy type, the prospector strategy ratio is 49%, while the defender strategy ratio is 51%.

Table 1. Relevant sectors

SG	F.	%
Chemicals sector	56	7.07
Construction sector	128	16.16
Food sector	152	19.19
Healthcare sector	8	1.01
Industrial sector	80	10.10
Oil sector	16	2.02
Personal sector	56	7.07
Real estate sector	152	19.19
Basic resource sector	48	6.06
Retail sector	16	2.02
Travel sector	48	6.06
Media sector	32	4.04
Total	792	100.00
Business strategy type		
Prospector strategy	388	49
Defender strategy	404	51
Total	792	100

2.2. Methodology

This study examines the impact of business strategy and financial constraints on crash risk on the Egyptian stock exchange. The analysis was conducted using ordinary least squares (OLS), generalized least squares (GLS), and path analysis techniques. The prospecting model to examine the effect of both business strategy and financial constraints on crash risk is as follows:

$$SPCR_{i,t} = \beta_0 + \beta_1 BST_{i,t} + \beta_2 FC_{i,t} + \sum_k^{\beta} controls_{i,t} + \varepsilon_{i,t}. \quad (1)$$

$$SPCR_{i,t} = \beta_0 + \beta_1 BST_{i,t} + \beta_2 FC_{i,t} + \beta_3 FS_{i,t} + \beta_4 LEV_{i,t} + \beta_5 BS_{i,t} + \varepsilon_{i,t}. \quad (2)$$

$SPCR_{i,t}$ refers to the crash risk, $BST_{i,t}$ refers to the business strategy, and $FC_{i,t}$ represents the financial constraints, $Controls_{i,t}$, including firm size (FS), board size (BS), and financial leverage (LEV).

The value of crash risk is determined based on the estimation of the value of the weekly market return per share through numerous ways to measure this risk, like the negative coefficient of skewness (NSCKEW) and down-to-up volatility (DUVOL) (Samir et al., 2023; Liu, 2022). NCSKEW is the

skewness of residual returns. DUVOL represents the log of the ratio of the standard deviation in the “down” weeks to the “up” weeks. The KZ index is measured as a proxy for financial constraints (Kaplan & Zingales, 1997; Keum & Eggers, 2018). A higher KZ index indicates higher financial constraints.

Business strategy (BST) is measured by a composite measure of five proxies for the firm. Each of the five distinct variables is ranked by dividing each two-digit SIC industry year into quintiles. The highest quintile within each company year is scored as 5, the second-highest quintile as 4, and so on, while the lowest quintile is scored as 1 (Cao

et al., 2022). After that, the scores are added for each company year so that a firm may obtain a maximum score of 23 (for a prospector-type company) or a minimum score of 7 (for a defender-type company). The business strategy was divided into two strategies, which take 1 if the business strategy scores between 7 and 17 for a defender-type company and 0 if the business strategy scores between 18 and 25 for a prospector-type company.

Control variables are three variables: *LEV* is the ratio of total debts to assets, *FS* is the log of total assets, and finally, and *BS* is the log of board members. All measurements of the variables used in this investigation are listed in Table 2.

Table 2. Measurements of variables

Variables	Measure	Predict Sig	References
Crash risk (SPCR)	The negative coefficient of skewness (NSCKEW)		Fu et al. (2021); Bae et al. (2021); Choi and Park (2022); Naffa and Dudás (2023); Zulfikar et al. (2022); Gao and Li (2021); Samir et al. (2023)
	The volatility of weekly returns from bottom to top (DUVOL)		Cui and Zhang (2020); Fu et al. (2021); Zorofchi et al. (2021); Choi and Park (2022); Ji et al. (2021); Gao and Li (2021); Xiao et al. (2022); Samir et al. (2023)
Financial constraints (FC)	$KZ = -1.002 (CF/TA) - 39.368 (DIV/TA) - 1.315 (CA/TA) + 3.129 LEV + 0.283 \text{ Tobin's } Q.$	+/-	Kaplan and Zingales (1997); He and Ren (2022); Bae et al. (2021)
Business strategy (BST)	Using five proxies, a composite measure was developed to assess the firm's business strategy. Organizations that exhibit prospector tactics tend to have higher strategy scores, whereas organizations that adopt defensive strategies tend to have lower scores. The proxies utilized in this study encompass the following factors: (a) the research and development to sales ratio; (b) the employees to sales ratio; (c) the historical growth measure represented by the one-year percentage change in total sales; (d) the fixed assets to total assets ratio; and (e) the market-to-book ratio.	+/-	Bentley et al. (2013); Habib and Hassan (2018); Wang and Liu (2022); Saleem et al. (2018); Safi et al. (2022)
Business strategy Type (BST_DUM)	The dummy variable takes 1 if the business strategy score is between 7 and 17 for a prospector-type company and 0 if the business strategy score is between 18 and 25 for a defender-type company	+/-	Bentley et al. (2013); Habib and Hassan (2018); Saleem et al. (2018); He et al. (2021); Safi et al. (2022)
Firm Size (FS)	The log of total assets	+/-	Rashed and Ghoniem (2022); Fu et al. (2021); Chebbi (2023); Bae et al. (2021); Safi et al. (2022); Abdel-Wanis and Rashed (2023); Khalil and Rashed (2023); Rashed et al. (2018); Shehata and Rashed (2021); Omara and Rashed (2023)
Leverage (LEV)	The ratio of total debts to total assets	+/-	Rashed and Ghoniem (2022); Fu et al. (2021); Bae et al. (2021); Safi et al. (2022); Khalil and Rashed (2023); Omara and Rashed (2023)
Board Size (BS)	The log of board members	+/-	He and Ren (2022); Abdel-Wanis and Rashed (2023); Samir et al. (2023)

3. EMPIRICAL RESULTS

The descriptive statistics facilitate the examination of the significance of all variables inside the regression model during the period from 2014 to 2021. Table 3 displays the descriptive statistics for each variable incorporated in the regression models.

The crash risk measures (NSKEW and DUVOL) have negative mean values (-0.274 and -0.153), respectively, suggesting a propensity for Egyptian firms to experience crash risk. The financial constraints (KZ) exhibit a positive mean value of 1.19. Firms exhibit a notable degree of volatility in terms of financial constraints and crash risk during the period spanning from 2014 to 2021, primarily attributed to an elevated standard deviation. Furthermore, the descriptive data reveal that the mean value of business strategy (BST) is 17.27. Additionally, the average values for FS, BS, and LEV are 13.56, 0.87, and 0.462, respectively. The Egyptian market has a steady and uniform relationship between business strategy, company size, board size, and financial leverage, suggesting that firms are expected to maintain stability from 2014 to 2021.

Table 3. Descriptive analysis

Var	Obs	Mean	SD	p1	p99	Skew.	Kurt.
NSKEW	792	-0.274	.319	-.818	.143	-.426	1.858
DUVOL	792	-.153	.173	-.43	.174	.192	2.147
BST	792	17.27	3.362	9	23	-.313	2.837
FC_KZ	792	1.19	1.278	-1.398	3.09	-.434	2.441
FS	792	13.56	1.78	10	18	.235	2.496
BS	792	.87	.123	.7	1.08	.065	1.925
LEV	792	.462	.221	.13	.8	.041	1.77

Table 4. Correlation table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	VIF
(1) NSKEW	1.000							
(2) DUVOL	0.371* (0.000)	1.000						
(3) BST	0.074* (0.038)	0.073* (0.041)	1.000					1.02
(4) FC_KZ	0.128* (0.000)	0.003 (0.931)	0.108* (0.002)	1.000				1.02
(5) BS	0.147* (0.000)	0.091* (0.010)	-0.051 (0.154)	0.053 (0.137)	1.000			1.23
(6) FS	-0.024 (0.508)	-0.041 (0.251)	-0.091* (0.010)	-0.043 (0.231)	0.388* (0.000)	1.000		1.47
(7) LEV	0.053 (0.136)	0.035 (0.324)	-0.034 (0.340)	0.013 (0.708)	-0.014 (0.704)	0.396* (0.000)	1.000	1.24

Note: * $p < 0.05$.

Table 4 displays the correlation matrix for each variable. The findings indicate there is a significant correlation between business strategy (BST) and crash risk (NSKEW and DUVOL). Additionally, there is a positive correlation between financial restrictions (FC_KZ) and crash risk (NSKEW); however, no significant correlation was observed with DUVOL. Moreover, a positive correlation has been shown between BS and crash risk (NSKEW & DUVOL). In contrast, this study found no significant correlation between FS, LEV, and crash risk (NSKEW & DUVOL). Based on the variance inflation factors (VIF), it can be observed that all values are below the threshold of 10, suggesting the absence of any multicollinearity concern.

Table 5 presents evidence supporting the presence of a stationary time series at a significance level of less than 0.05. Furthermore, it can be shown that the probability value of the Chi-square test statistic is greater than 0.05 for both NSKEW and DUVOL in all models, indicating the presence of homoscedasticity. Based on the f-value analysis of the NSKEW and DUVOL models, it can be concluded that there are no missing variables, and the probability value exceeds the threshold of 0.05. Also, the results show that there is an autocorrelation problem because the significant level is greater than 0.05. To overcome and solve the auto-correlation problem, this study used GLS along with OLS to obtain the best results via two measures of crash risk (NSKEW and DUVOL).

The findings of the OLS and GLS estimations are presented in Table 5. OLS analysis determines that the F-test is statistically significant at 1%. In the context

of Egyptian companies listed on the stock exchange, it has been observed that crash risk can be attributed to factors such as firm strategy and financial constraints. These factors collectively contribute 12% of the crash risk ($R^2 = 0.126$). The results obtained indicate a strong alignment between all panel models of crash risk (NSKEW and DUVOL).

The impact of business strategy on crash risk (NSKEW & DUVOL) is found to be positively statistically significant in both OLS and GLS models at a level of 5%. The results show that the prospector strategy has a positive effect on crash risk compared to the defender strategy. Also, financial constraints (FC_KZ) have a positive effect on the crash risk (NSKEW) at a level of 5%. The results demonstrate that FS negatively affects crash risk at a level of 1%. The findings show that both BS and LEV have a positive effect on crash risk at 1% and 5% of both GLS and OLS models, respectively.

Table 6 presents the findings about the relationship between business strategy and crash risk, considering both the direct and indirect effects mediated by financial constraints.

Table 6 indicates that the association between business strategy and crash risk is obtained from line 1, and the path coefficients are 0.006. This means that there is a positive and significant association between business strategy and crash risk. This result confirms the results of Table 5 and accepts the first hypothesis (H_1). Also, the association between financial constraints and crash risk is obtained from line 2, and the path coefficients are 0.030, which means that there is a positive relationship between financial constraints and crash risk. This result confirms the results of Table 5 and accepts the second hypothesis (H_2).

Table 5. OLS and GLS results

Variable	OLS				GLS			
	NSKEW		DUVOL		NSKEW		DUVOL	
BST	.0079*		.004*		.0079*		.003*	
BST_Prospector		.0532*		.0190		.0532*		.019
FC_KZ	.0175*	.0177*	-.001	-.0008	.0175*	.0177*	-.0012	-.001
BS	.5196***	.522***	.222***	.222***	.5196***	.522***	.222***	.22***
FS	-.0275***	-.027***	-.013***	-.013***	-.0275***	-.027***	-.013***	-.01***
LEV	.1868**	.1887**	.085**	.086**	.1868**	.188**	.086**	.09**
Cons	-.15412	-.0408	-.1253	-.0504	-.1641	-.050	-.121	-.065
N	792	792	792	792	792	792	792	792
R2	.126	.126	.078	.0761				
Adj-R2	.099	.099	.049	0.047				
F	4.622	4.62	2.713	2.634				
Prob > F	.000	.000	.000	0.000				
AIC	381.1	381.1	-547.6	-545.9				
BIC	498.03	497.9	-430.82	-429.1				
RMSE	.3030	.303	.1685	.168				
Chi2					114.6	114.7	67.2	65.3
Prob → Chi2					.000	0.000	.000	0.000
Breusch-Pagan Test (Chi2)	0.67	0.71	0.99	0.98				
Prob → chi2	0.41	0.40	0.320	0.323				
Ramsey Test F(3, 764)	1.60	1.57	1.61	1.28				
Prob > F	0.188	0.195	0.185	0.281				
Wooldridge Test F(1, 98)	941.16	957.40	12.648	12.81				
Prob > F	.000	0.000	0.001	0.000				
Levin-Lin-Chu Unit Root (T-Test)		-79.68		-25.39				
p-value		0.000		0.000				

Note: *** Less than .001, ** less than .01, and * less than .05.

Table 6. Hypothesis testing results

H	Path analysis	Beta	Std. Err	T-value	P- value	Accepted /Rejected
Direct Effect						
H1	Business strategy → crash risk	.006	0.003	2.03	0.031*	Accepted
H2	financial constraints → crash risk	.030	.009	3.45	0.001**	Accepted
H3	Business strategy → financial constraints	.041	.013	3.07	0.002**	Accepted
Indirect Effect						
H4	Business strategy → financial constraints → crash risk	0.001	0.0005	2.29	0.022*	Accepted

Note: *** Less than.001, ** less than.01, and * less than.05.

Table 6 shows the direct association between business strategy and financial constraints presented in line 3. The path coefficient is 0.041, which means that business strategy has a direct, positive, and significant effect on financial constraints, so the third hypothesis (H_3) is accepted. The results show the indirect effect of financial constraints on the link between business strategy and crash risk in line 4. The path coefficient is 0.001, which means that business strategy has an indirect, positive, and significant effect on crash risk through financial constraints as a mediator variable, so the fourth hypothesis (H_4) is accepted. Finally, the researcher calculates the variance accounted for (VAF) from mediation analysis, which is calculated by the value of the indirect effect scaled by the total effect as shown in the following table.

Table 7 concludes that the effect size of the variance calculated from the mediation analysis is 18%, which indicates the presence of partial mediation. Thus, financial constraints are accepted as a mediator variable for the relationship between business strategy and crash risk.

3.1. Robustness check

Table 8 demonstrates how to determine whether the business strategy effect is resilient by substituting a dummy variable for the business strategy type, either prospector or defender. If the business strategy is greater than 17, take 1 as a prospector value, and 0 otherwise. The results in Table 8 are consistent with the results in Table 6, showing the mediating role of financial constraints on the link between prospector strategy and crash risk at the

Table 7. Effect size of the financial constraints as a mediator variable for the fourth hypothesis

Steps	Hypotheses	Path analysis	Beta
First Step: Calculating the direct effect without the financial constraints			
Step 1	H1	Business strategy → crash risk	0.006*
Second step: Calculating the indirect effect with the presence of the financial constraints			
Step 2	H4	Business strategy → financial constraints → crash risk	0.001***
Third Step: Total effect (direct effect + indirect effect)			
Step 3		Business strategy → crash risk	0.007***
Fourth Step: Calculated the variance size = indirect effect/total effect			
Step 4		Business strategy → crash risk	0.18

Note: *** Less than.001, ** less than.01, and * less than.05.

Table 8. Robustness check

H	Path analysis	Beta	Std. Err	T-value	P- value	Accepted/ Rejected
Direct Effect						
H1	Prospector strategy → crash risk	.0398	0.020	1.99	0.044*	Accepted
H2	financial constraints → crash risk	.0306	.009	3.47	0.001**	Accepted
H3	Prospector strategy → financial constraints	.2364	.0904	2.62	0.009**	Accepted
Indirect Effect						
H4	Prospector strategy → financial constraints → crash risk	0.0072	0.0035	2.09	0.037*	Accepted

Note: *** Less than.001, ** less than.01, and * less than.05.

Table 9. Robustness check for the effect size of the financial constraints as a mediator variable

Steps	Hypotheses	Path analysis	Beta
First Step: Calculating the direct effect without the financial constraints			
Step 1	H1	Business strategy → crash risk	0.0398*
Second step: Calculating the indirect effect with the presence of financial constraints			
Step 2	H4	prospector strategy → financial constraints → crash risk	0.0072*
Third Step: Total effect (direct effect + indirect effect)			
Step 3		Prospector strategy → crash risk	0.0470*
Fourth Step: Calculated the variance size = indirect effect/total effect			
Step 4		Prospector strategy → crash risk	0.15

Note: *** Less than.001, ** Less than.01, and * less than.05.

1% level. The results highlight the positive effect of prospector strategy on crash risk in addition to the positive effect of prospector strategy on financial constraints. Also, the results confirm that financial constraints have a positive effect on crash risk. Finally, the results show the positive indirect effect of financial constraints on the link between prospector strategy and crash risk.

Table 9 confirms that the effect size of the variance calculated from the mediation analysis is 15%, which indicates the presence of partial mediation. Thus, financial constraints are accepted as a mediator variable for the relationship between prospector strategy and crash risk.

4. DISCUSSION

This paper examines whether types of business strategy, prospectors, and defenders influence the crash risk in the Egyptian market. More importantly, this paper examines how financial constraints affected the previous relationship. Consistent with prior literature, the results are found to confirm that the effect of financial constraints on the association between business strategy and stock price crash risk differs depending on the type of business strategy of defenders and prospectors (Dang et al., 2017; Bae et al., 2021).

Depending on the characteristics of the business strategy type, the optimal allocation of resources is helpful for investors in allocating assets cautiously among companies with diverse strategies (Cao et al., 2022). Also, prospector firm strategy has a positive effect on crash risk. Prospective business strategies may invest in risky projects for higher gains or to enhance the chances of ir-

regularities and misinformation (Safi et al., 2022), follow innovative strategies (Saleem et al., 2018), and be more likely to face higher uncertainty risks (Arianwuri et al., 2017; Razmian et al., 2020; Ryu, 2021; Weber & Müßig, 2022).

Prospector strategy focuses on opening up new markets and producing a unique product range continuously (Li et al., 2022). Prospectors face more information asymmetry, which can lead to increased financial constraints (Razmian et al., 2020). Hence, the bad news hoarding theory shows that the sudden release of bad news leads to relatively high stock prices that can significantly decrease quickly. In other terms, it can be due to some management efforts in delaying the informing of bad news that can ultimately lead to the SPCR (Arianwuri et al., 2017; Saleem et al., 2018; Zhu et al., 2023; Xu et al., 2023).

Defender firm strategy hurts stock price crash risk because defender-type firms have the opposite of the extreme characteristic features of prospector firms. It focuses on cost leadership, limits the product types produced by the firm, less R&D investment, fewer employee turnovers, a stable organizational structure, faces less uncertainty, strong profitability, and the ability to earn cash flow in the future, and low financing constraints (Arianwuri et al., 2017; Li et al., 2022). Despite that, Arianwuri et al. (2017) show that the defender strategy has no significant effect on the SPCR. This is due to the defender strategy's focus on market stability and concern for long-term stability, which limited the product types produced by the firm, so the possibility of SPCR in this strategy is low.

Financial constraints have a positive effect on crash risk. This result agrees with literature such

as Bea et al. (2021) and Choi & Park (2022), which show financial constraints are frictions that prevent firms from funding desired and profitable investments due to their high cash flow uncertainty. Hence, these firms will face severe stock price volatility. Furthermore, financially constrained firms have strong incentives to bury bad news for an extended period to secure external funds, are subject to higher default risk, and are more likely to have an SPCR when they default (He & Ren, 2022).

According to the theory of optimal resource allocation, especially under constraints on resources, to survive and grow, firms need financial resources from relevant sources to execute profitable projects. Accordingly, it is predicted that financial constraints mediate the core relationship. Financial constraints on prospector types significantly limit firms' investments in intangibles for R&D, design, software, and any process improvements. Financial constraints reduce firms' investments in intangibles, but

the strength of this effect is the same in motivating and training their possible innovative use by non-innovative and innovative firms (Montresor & Vezzani, 2022). Furthermore, the listed firm with financial constraints cannot gain technological superiority when competing firms face higher SPCR and no ability to implement competitive strategies. Also, financial constraints are the main obstacles to corporate innovation (Hall & Lerner, 2010).

Defenders minimize financial opacity through loss avoidance and increase it through aggressive earnings, especially when they face lower financial constraints and a decline in their production demand (Chin, 2023). Despite that, the firms that adopt an innovation-oriented strategy (prospectors) offer significantly more trade credit to their customers than those that adopt an efficiency-oriented strategy (defenders). Finally, prospectors receive significantly more trade credit from their suppliers (Cao et al., 2022).

CONCLUSION

This paper explores the mediating effect of financial constraints on the association between business strategy and crash risk using a sample of 99 Egyptian firms over the period 2014 to 2021 via OLS, GLS, and path analysis. This study advances understanding of the capital market consequences of the types of business strategies and their financial constraints that play essential roles in firm operations and their major catalysts for SPCR. Additionally, business strategy is an organizational roadmap for achieving the overall vision and aims to give a firm a competitive advantage within a business model that includes tactics for marketing, finance, operations, and other areas.

The results exhibit that depending on the type of business strategy (prospector or defender) impacts SPCR in Egyptian firms using both OLS and GLS. More specifically, this study finds that the prospector firm strategy has a positive effect on SPCR compared to the defender firm strategy. Also, financial constraints have a positive impact on SPCR. Finally, this paper contributes to the literature by bringing evidence from emerging countries like Egypt, which is less investigated in the literature, and by exploring the mediation impact of financial constraints on the association between business strategy and SPCR. The results show that financial constraints play a partial vertical mediation role in eliminating the association between the type of business strategy and SPCR via path analysis. The results confirm the positive impact of financial constraints on the association between prospector business strategy and SPCR.

Unfortunately, there are still many important gaps in this study. First, the study used PCSE, GLS, and route analysis to investigate how business strategy increased crash risk via the mediating effect of financial constraints in Egyptian listed businesses. Future studies may incorporate dynamic panel data and vector auto-regression (VAR) techniques for more robust results. Additionally, although financial firms may have been included to obtain an overall picture of the Egyptian market, the primary focus of this study was on non-financial listed companies. The analysis only used data from 2014 to 2021. To analyze the effects of the Egyptian revolution starting in 2011, datasets from before 2014 may be used.

There are many possibilities for further investigation. First, this analysis exclusively included non-financial companies listed in Egypt. However, a similar examination might be carried out by looking at how management ability and board gender diversity affect the relationship between business strategy and crash risk. Second, investigate how political relationships affect the association between business strategy and crash risk.

AUTHOR CONTRIBUTIONS

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