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FIRM PERFORMANCE IN TIMES OF CRISIS: DOES AN INNOVATIVE BUSINESS STRATEGY MATTER?

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Abstract. This study examines whether a firm's business strategy – innovative vs. conservative – determines the extent to which a crisis impacts its performance. To explore this, the study calculates business strategy scores as a composite measure of six variables, where a high (low) score indicates an innovative/prospective (conservative/defensive) strategy. The COVID-19 pandemic (2020–2021) serves as the crisis context for the analysis. Using a sample of 7,143 firm-year observations in the U.S., the study finds that while the sample firms experienced a decline in their performance during the COVID-19 crisis period compared to the pre-crisis level (2018–2019), the decline was less pronounced for firms following innovative strategies. This finding suggests that a firm's business strategy is a crucial determinant of its performance during a crisis. The study enhances theoretical understanding that business strategy is particularly important when operating conditions are abnormal.

Keywords: business strategy, innovation, prospectors, defenders, COVID-19, firm performance.

JEL Classification: M21, G32, D22.

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1. Introduction

The unprecedented global disruption caused by the COVID-19 pandemic has thrust the corporate world into a period of intense uncertainty, challenging traditional paradigms of business strategy and performance (Miroshnychenko et al., 2024). While theoretical frameworks suggest that business strategy plays a critical role in determining firm adaptability during crises (Hambrick, 1983; Yuan et al., 2020), there remains a scarcity of empirical studies investigating this relationship. Thus, this study's objective is to examine the association between business strategy and firm performance during the COVID-19 crisis and to explore the influence of a firm's investment in innovation activities on this association.

According to management and organizational theorists, firms are classified into three strategic groups: prospectors, defenders, and analyzers (Miles & Snow, 1978; Snow & Hambrick, 1980). Prospectors pioneer in the market by introducing new products/services mainly through extensive investment in innovative activities. Hence, they are considered innovative firms[1] that can quickly change the product mix, leading them to capture the best

[1] We use the terms "prospectors" and "innovative firms" interchangeably unless otherwise specified.

opportunities as they arise (Chen et al., 2017). In addition, prospectors provide more discretion to the managers in decision-making (Navissi et al., 2017), leading them to make quick decisions. Prior research shows that quick decision-making has positive implications for firm performance, especially in times of crisis (e.g., Haque et al., 2024). Firms that rarely focus on new product development and prefer to compete in the market by emphasizing existing product/service attributes (e.g., price and quality) are considered defenders. These firms concentrate on enhancing efficiency within their existing capacity and, consequently, invest less in innovation activities than prospectors (Hambrick, 2003; Menguc & Auh, 2008). As a result, they are regarded as conservative[2] in terms of innovation. Analyzers adopt a middle-ground strategy, blending the characteristics of both prospectors and defenders.

Ex-ante, it is still being determined whether and, if so, how innovative or conservative business strategy makes a difference to firm performance in times of crisis. On the one hand, prospectors (i.e., innovative firms) may perform better than others due to their innovative characteristics and close connection with the stakeholders. Innovations through R&D create dynamic capabilities that increase a firm's ability to adapt to changing conditions. Defenders (i.e., conservative firms) may be at a disadvantage when it comes to creating dynamic capabilities due to their limited investment in innovation (Hambrick, 2003), which puts them at risk of technological obsolescence. This could potentially put them behind the prospectors in terms of adaptability. Thus, it is possible that prospectors had an upper hand in terms of their performance during the COVID-19 crisis. However, the opposite scenario is also possible due to uncertainties in getting returns from investment in innovative activities. Allocating resources to R&D, for instance, does not guarantee the creation of commercially viable products and services, and if so, such investment would result in poor firm performance for the prospectors.

This study tests the above competing perspectives on a sample of 2,258 firms in the U.S. covering two-year pre-COVID period (2018 and 2019) and the same period during COVID crisis (2020 and 2021). The required data were obtained from Compustat and BoardEx. A firm's business strategy score is derived from six key variables, with higher scores indicating an innovative (prospector) strategy and lower scores reflecting a conservative (defender) strategy. Firm performance is measured using return on assets (ROA). The data were analyzed using an ordinary least squares (OLS) regression, which estimates the relationship between business strategy and firm performance while controlling for firm-specific and industry-level factors.

The results reveal the following insights. First, business strategy plays a significant role in determining firm performance during crisis conditions. While all sample firms experienced a notable decline in their ROA during the COVID period relative to the pre-COVID period, firms in the top quartile of business strategy scores (i.e., prospectors) reported an ROA that was 2.72% higher than those in the bottom quartile (i.e., defenders). Second, we further examine firms' investment in R&D, and find that innovative activities were a key driver of prospectors' competitive advantage during the crisis. These findings highlight the pivotal role of R&D investment in fostering dynamic capabilities that enhance firm resilience and adaptability during crises.

With the above findings, this study contributes to literature in two ways. First, it adds to the literature on business strategy and the resilience of firm performance during an unprecedented crisis. Prior research primarily focuses on isolated elements of business strategy when examining firm performance during the COVID-19 crisis, such as R&D intensity (Biswas, 2022). This study distinguishes itself by bundling multiple elements of firm policies, enabling the calculation of comprehensive strategy scores and illustrating their joint implications for

[2] We use the terms "defenders" and "conservative firms" interchangeably unless otherwise specified.

firm performance during the crisis. Second, while it is theoretically suggested that a firm's business strategy determines its level of resilience in times of unsteady operating conditions (Hambrick, 1983; Yuan et al., 2020), there is little empirical evidence to support (or reject) this conjecture. This study's finding that innovative firms suffered less than their industry peers during the COVID crisis provides empirical evidence supporting the notion that business strategy indeed determines the extent to which a firm is susceptible or resistant to a crisis.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature; Section 3 describes the data and research design; Section 4 presents the empirical results; Section 5 discusses the key findings; and Section 6 concludes the study.

2. Literature review

2.1. Theories on business strategy

Business strategy involves systematic decisions guiding a firm's direction to gain a competitive edge in the industry (Lee et al., 2010; Schuler & Jackson, 1987). The business strategy helps explain what directs a firm's performance and why some firms perform better or worse than others (Ketchen Jr et al., 1996). Despite various business strategy typologies, including cost-leadership versus product differentiation (Porter, 1980) and exploration versus exploitation (March, 1991), Miles and Snow's (1978) one is the most widely used in the organizational strategy literature. This is perhaps because the typology can easily be constructed and tested using archival data, while other typologies need surveys or interviews, which does not enable replicable measures of business strategy (Yuan et al., 2020). As such, this study limits its focus to Miles and Snow's (1978) approach.

According to Miles and Snow (1978), business strategy can take one of the following three forms[3]: defender, analyzer, or prospector. Defenders adopt a cost leadership strategy and focus on a narrow product-market niche. Their core competence lies in improving efficiency rather than aggressively seeking new opportunities through investment in innovative activities. A key feature of this defender type of business strategy is that firms following this strategy usually fail to adapt to risky and uncertain operating conditions (Higgins et al., 2015). In contrast, prospectors are innovative firms exploring new markets and embracing uncertain conditions (Kong et al., 2020). The competitiveness of these firms relies on their capacity to pioneer products through investment in R&D activities. The analyzer firms possess attributes of both defenders and prospectors. These firms adapt by taking proactive or defensive measures depending on their economic settings and the balance between efficiency and innovation. Their aim is typically to minimize the risks associated with low profitability and challenges prospectors face while maximizing growth opportunities that defenders overlook (Miles & Snow, 1978, 2003). While a firm typically is not required to change its business strategy, it faces challenges in defining and implementing a new strategy when circumstances change (Allaire & Firsirotu, 1989).

2.2. Business strategy and performance

Although the relationship between business strategy and firm performance has been extensively studied, the findings remain inconclusive. Prospectors are often associated with embedding innovation into their strategy, which can enhance financial and non-financial

[3] There is a fourth form of business strategy named "reactor" but this strategy is not viable to firms.

performance. Specifically, prospectors' innovation-oriented approach leads to new products and services, which, in turn, helps firms interact with their customers better than other firms (Blumentritt & Danis, 2006). Apart from in-house innovation efforts, prospectors may align closely with this open innovation model, which increases the possibility of innovative efforts being successful.

Amimakmur et al. (2024) study the moderating effects of innovation on the association between firm size and performance, and document that the positive effect of firm size on performance is amplified through innovation, highlighting the importance of innovation activities. Several other studies also document a positive impact of innovation activities on firm outcomes (e.g., Jutidharabongse et al., 2024; Mansour et al., 2024; Valdez-Juárez et al., 2022). However, other studies report suboptimal outcomes linked to business strategies. For instance, Navissi et al. (2017) document that prospectors tend to overinvest, leading to inefficiencies, while defenders often underinvest, compromising their growth potential. These tendencies can negatively impact firm performance, particularly during periods of uncertainty. Furthermore, some research suggests that the success of innovation activities depends on the strategic alignment between innovation efforts and broader business strategies (Ngo, 2023).

In addition to the innovative culture, prospectors differ from others regarding their social roles. For instance, Kong et al. (2020) report that prospectors make more environmental protection efforts than defenders. Yuan et al. (2020) focus on the firm's corporate social responsibility (CSR) and report that prospectors are more inclined to participate in and reap the benefits of CSR activities. In sum, while innovation-oriented strategies like those of prospectors have the potential to enhance firm performance, their efficacy during crises is under-researched and ambiguous. This study aims to address this gap by analyzing the effects of innovative and conservative strategies on firm outcomes during the COVID-19 crisis.

2.3. Firm performance during the COVID-19 crisis

The COVID-19 pandemic profoundly disrupted global economic systems, presenting unprecedented challenges for firms. The crisis led to operational disruptions, supply chain breakdowns, and demand fluctuations, resulting in significant declines in firm performance across industries. For example, Hu and Zhang (2021) document a 1.4% decrease in return on assets for every 10% increase in COVID-19 cases. Firms in sectors such as tourism and hospitality experienced severe declines, with some reporting up to a 348% decrease in return on assets in 2020 compared to 2019 (Haque, 2024). Similar results are reported in studies focusing on the firm's stock market performance (e.g., Erdem, 2020; Lee et al., 2023; Mazur et al., 2021). Despite the negative impact of the crisis on the firm's financial and stock market performance, surprisingly, Popescu (2021) finds little impact of COVID-19 on business formations in Romania. They noted that, except for the months of March and April 2020, the number of business formations in 2020 was higher than their corresponding numbers in 2019.

Despite these challenges, some firms demonstrated resilience by leveraging specific characteristics. Research indicates that operating flexibility, innovation-oriented capabilities, and strategic investments played critical roles in mitigating the negative impact of the crisis. Prior research argues that flexibility is crucial for a firm's profitability, especially in times of crisis. Such flexibility may relate to marketing (such as changes in product mix) and supply chain relationships (Dreyer & Grønhaug, 2012). For instance, Liu et al. (2021) show that firms with high operating flexibility faced less reduction in their abnormal stock returns during the COVID-19 crisis. During the pandemic, Dovbischuk (2022) focused on logistics service providers and logistics departments and investigated the relationship between innovation-oriented dynamic

capabilities and firm performance. Specifically, they considered dynamic capabilities in the form of new knowledge, employee training, cross-functional collaboration, and inter-firm relationships with business partners. They found a positive association between the variables, suggesting that innovation-oriented dynamic capabilities mitigate the negative shock of a crisis. El Chaarani et al. (2022) explored the impact of competitive innovation on the performance of Lebanese SMEs and reported a significantly positive impact of process innovation and marketing innovation on their financial performance. The study noted that the impact of marketing innovation was greater than process innovation, suggesting that factors such as customer satisfaction and loyalty are important in times of crisis. Shen et al. (2020) report a negative impact of COVID-19 on firm performance, while this impact is less pronounced for firms with high investment scale and sales revenue. Cui et al. (2021) studied the firm's accounting practice and reported that firms with more conditionally conservative accounting practices during the crisis had higher stock returns than others. Watkins et al. (2009) report that, while group affiliation weakens firm performance in normal operating conditions, it helps firms reduce the negative impact on performance during crisis times.

This study builds on the above works by examining how different business strategies, particularly those characterized as innovative or conservative, influenced firm performance during the COVID-19 crisis. The findings will contribute to a deeper understanding of the strategic factors that enable firms to adapt and thrive in periods of uncertainty.

3. Data and methods

The dataset comprises publicly listed firms in the U.S., excluding those in the financial and utility industries. The study spans the years from 2018 to 2019 (pre-COVID period) and 2020 to 2021 (COVID period). The accounting data are from Compustat, while the CEO and governance data are from BoardEx.[4] After dropping firms for which required data are missing, the final dataset comprises 7,143 firm-year observations from 2,258 unique firms.

This study estimates the following OLS regression to examine if the business strategy had any differential effect on firm performance in the COVID period compared to the pre-COVID level.

$$ROA = \alpha + \beta_1 STRATEGY + \beta_2 COVID + \beta_3 STRATEGY \times COVID + \beta_4 Controls + Industry\ FE + \in, \quad (1)$$

where *ROA* is the firm's return on assets (earnings before interest and taxes/total assets).[5] Following the methodology of Bentley et al. (2013), this study computes a discrete *STRATEGY* composite score that serves as a proxy for business strategy, with high scores indicating prospector strategies and low scores indicating defender strategies. Specifically, this study considers the following firm characteristics: (i) ratio of R&D to sales, (ii) ratio of total employees to sales, (iii) standard deviation of the number of employees, (iv) one-year percentage change in sales, (v) ratio of selling, general and administrative expenses to sales, and (vi) ratio of

[4] Compustat and BoardEx are widely used financial databases, referenced in notable research such as Fama and French (1992), Arora et al. (2021), and Homroy and Slechten (2019).

[5] We chose ROA to capture firm performance because it comprehensively evaluates overall operational efficiency by measuring how effectively it uses all its assets – both equity and debt – in times of crisis to generate profit. This is particularly relevant during crises, when firms often rely heavily on internal and external resources to sustain operations, and ROA comprehensively captures this efficiency. Other performance measures are not used as they may potentially mask financial strain in times of crisis. For instance, return on equity (ROE) overlooks debt financing, which tends to increase during crises. In times of suppressed revenue, such as during the COVID-19 crisis, sales figures usually do not match the firm's size, making the return on sales (ROS) less suitable for cross-sectoral analyses. Because of market imperfections, market-based performance measures such as Tobin's Q may fail to capture the firm's performance dynamics (see Haque et al., 2022 for details).

property, plant, and equipment (PPE) to total assets. All these variables are derived using a rolling average over the preceding five years. Then, each of the six variables is ranked by creating quintiles within each 2-digit standard industrial classification (SIC) code and year. Observations in the highest quintile are given a score of 5, in the second-highest quintile a score of 4, and so on, except for the ratio of PPE to total assets, which is reversed-coded. Following that, scores from the six variables are totaled for each firm-year, with a potential maximum score of 30 and a minimum of 6 for each firm. According to Bentley et al. (2013), firms with strategy scores in the lower range (6 to 12) are classified as defenders, while those with scores in the higher range (24 to 30) are categorized as prospectors.[6] This classification aligns with the classical theories of Miles and Snow (1978) and Hambrick (1983), which propose that prospectors are firms that emphasize innovation and are distinguished by their aggressive investments in research and development. Accordingly, we consider prospectors as innovators.

The regressions use a one-year lagged *STRATEGY* score to avoid reverse causality concerns. *COVID* is an indicator variable set to 1 for firm-year observations in 2020 and 2021 and 0 for 2018 and 2019.

Equation (1) controls the firm-, governance-, and CEO characteristics. The firm characteristics include the log of total assets (*Firm Size*), the ratio of capital expenditure to sales (*Capex*), cash to total assets (*Cash*), total debt to total assets (*Leverage*), free cash flow to total assets (*FCF*), research and development expenditure to total assets (*R&D*), and prior year ROA (*Lag ROA*). The corporate governance controls include the number of directors on the board (*Bod Size*), the number of independent directors to total directors (*Bod Ind*), the number of female directors to total directors (*Fem Dir*), and the log of the CEO's tenure in current role (*CEO Ten*). The controls for CEO characteristics are a dummy variable capturing the CEO gender (*Fem CEO*), and the log of the CEO age (*CEO Age*). All these variables are assessed concurrently.

Table 1. Descriptive statistics

	Obs.	Mean	SD	p25	p75
ROA	7,143	–0.0046	0.2172	–1.0371	0.3572
STRATEGY	7,143	16.8030	3.7538	9.0000	26.0000
Firm Size	7,143	7.0178	2.0377	2.3979	11.8297
Capex	7,143	0.0881	0.2119	0.0002	1.6699
Cash	7,143	0.1638	0.1787	0.0010	0.8271
Leverage	7,143	0.2861	0.2358	0.0000	1.1824
FCF	7,143	0.0749	0.3113	–3.8800	1.3090
R&D	7,143	0.0633	0.1177	0.0000	0.6362
Bod Size	7,143	8.4857	2.1351	4.0000	14.0000
Bod Ind	7,143	0.7925	0.1183	0.3750	0.9231
Fem Dir	7,143	0.2035	0.1226	0.0000	0.5380
CEO Ten	7,143	1.0930	1.1559	–2.3026	3.3286
Fem CEO	7,143	0.0571	0.2321	0.0000	1.0000
CEO Age	7,143	4.1371	0.1227	3.7955	4.4403

Note: This table reports descriptive statistics. The sample periods are from 2018 to 2021.

[6] This methodology to calculating strategy scores is widely accepted in the academic literature (e.g., Habib & Hasan, 2017, 2021; Yuan et al., 2020). The quintile ranking simplifies the aggregation of multiple variables into a composite score, making it feasible for large-scale analysis across diverse firms. Further, equal weighting ensures that no single characteristic disproportionately influences the score, maintaining a balanced representation.

Table 1 presents the summary statistics of the variables used in the baseline regression. All continuous variables are winsorized at the 1% and 99% levels. The mean *STRATEGY* score is 16.80, and the average firm had a *ROA* of –0.46%. Multicollinearity in baseline regression is tested, revealing an average variance inflation factor of 1.54, with the highest value observed for *Firm Size* at 2.67. Thus, multicollinearity does not seem to be a concern.[7]

4. Results

4.1. Main results

Table 2 presents the results estimated using Equation (1). Column 1 does not include control for industry-fixed effects, while Column 2 does.[8] The coefficient of *COVID* in both columns is significantly negative, suggesting a decrease in firm *ROA* during the COVID crisis compared to the pre-COVID period. Interestingly, the coefficient of *STRATEGY* in Columns 1 and 2 is negative and significant at the 1% level, which suggests that, in the pre-COVID period, firms with high *STRATEGY* scores (i.e., prospectors) had lower *ROA* than those with low scores (i.e., defenders). According to Column 2, firms with *STRATEGY* scores in the 75th percentile had a *ROA* which is, on average, 3.74% lower than those in the 25th percentile (–0.0022 * [26 – 9] = –3.74%) in the pre-COVID period.

The coefficient of our main explanatory variable, *STRATEGY*COVID*, is significantly positive in both columns. Since the individual coefficient of *COVID* is significantly negative, the significantly positive coefficient of *STRATEGY*COVID* indicates a reduced effect of the crisis on performance as the firm's business strategy score increasingly aligns with that of a prospector. The results in Column 2 suggest that during the COVID crisis, firms with *STRATEGY* scores in the 75th percentile had an *ROA* that is, on average, 2.72% higher than those in the 25th percentile (0.0016 * [26 – 9] = 2.72%).

Since firms with a high strategy score performed poorly (better) than those with a low score in the pre-COVID (COVID) period, a joint coefficient test is conducted to determine any marginal difference between the periods. An *F*-test result confirms that the combined coefficient of *STRATEGY* and *STRATEGY*COVID* is not significantly different from zero (–0.0022 + 0.0016 = 0; $F = 1.48$, $p = 0.22$), suggesting that the pre-COVID performance gap (of 3.74%) for the average firm with *STRATEGY* scores in the high and low quartiles is wholly erased during the COVID period in 2020 and 2021.

The sign of coefficients of the control variables in Table 2 aligns with those documented in earlier research. For instance, *Firm Size* and *FCF* coefficients are significantly positive, indicating better performance in larger than smaller firms and firms with high free cash flow (Shen et al., 2020; Wang, 2010).

[7] We observe a strong correlation between the ratio of total employees to sales and (a) the one-year percentage change in sales (r = 0.6351), (b) the ratio of selling, general, and administrative expenses to sales (r = 0.5670), and (c) the ratio of research and development expenses to sales (r = 0.9053). These high correlations among certain variables used in calculating the STRATEGY scores may affect our regression results. To address this, we employed two approaches: (i) recalculating the STRATEGY scores after excluding the ratio of total employees to sales and (ii) recalculating the STRATEGY scores after excluding both the ratio of total employees to sales and the one-year percentage change in sales. We then performed the baseline regression using these adjusted STRATEGY scores. In both scenarios, our main inferences remained consistent (the results are unreported).

[8] None of the regression estimations include year-fixed effect as the *COVID* dummy captures such effects.

Table 2. Business strategy and firm performance

	(1)	(2)
	ROA	ROA
STRATEGY	–0.0019***	–0.0022***
	(0.0004)	(0.0004)
COVID	–0.0290***	–0.0297***
	(0.0105)	(0.0105)
STRATEGY×COVID	0.0016**	0.0016**
	(0.0007)	(0.0006)
Firm Size	0.0099***	0.0113***
	(0.0009)	(0.0009)
Capex	–0.0826***	–0.0711***
	(0.0083)	(0.0087)
Cash	0.0773***	0.0775***
	(0.0115)	(0.0117)
Leverage	–0.0107*	–0.0097
	(0.0062)	(0.0067)
FCF	0.2330***	0.2368***
	(0.0122)	(0.0126)
R&D	–0.3365***	–0.3505***
	(0.0257)	(0.0280)
Lag ROA	0.4629***	0.4475***
	(0.0163)	(0.0164)
Bod Size	–0.0015**	–0.0021***
	(0.0007)	(0.0007)
Bod Ind	0.0117	0.0019
	(0.0089)	(0.0094)
Fem Dir	0.0009	0.0015
	(0.0108)	(0.0109)
CEO Ten	0.0020*	0.0018*
	(0.0011)	(0.0011)
Fem CEO	0.0003	0.0006
	(0.0048)	(0.0048)
CEO Age	0.0232**	0.0220**
	(0.0106)	(0.0107)
Industry FE	No	Yes
Observations	7,143	7,143
Adj. R-Squared	0.832	0.835

Note: This table presents regression results on the association between business strategy and firm performance. All variables are defined in the Appendix. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

4.2. Endogeneity

This study's research design relates a year's performance to the prior year's business strategy score and, thus, mitigates endogeneity concerns caused by reverse causality. However, the results can still be subject to other endogeneity issues. Specifically, the relationship between business strategy and firm performance may also be influenced by unobservable firm heterogeneity, like the corporate culture's adaptability in a crisis, which presents an opportunity for further refinement in our regression model. To address this concern, the baseline regression is modified in Equation (1) to include firm-fixed effects that would control for unmeasured effects that remain the same within a firm across the sample period but may vary from one firm to another (Wade et al., 2006). The results are presented in Column 1 of Table 3. The coefficient of *STRATEGY*COVID* is positive and significant, echoing the baseline results in Table 2 and suggesting that key findings are not subject to endogeneity concerns arising from omitted time-invariant firm characteristics.

Table 3. Endogeneity

	Firm FE	Entropy Balance Matching
	(1)	(2)
	ROA	ROA
STRATEGY	–0.0017**	
	(0.0008)	
STRATEGY×COVID	0.0021***	
	(0.0007)	
PROSPECTOR		–0.0055
		(0.0088)
PROSPECTOR×COVID		0.0333**
		(0.0144)
COVID	–0.0519***	–0.0050**
	(0.0105)	(0.0023)
Control variables	Included	Included
Industry FE	No	Yes
Firm FE	Yes	No
Observations	7,143	7,143
Adj. R-Squared	0.484	0.834

Note: This table presents firm-fixed effects (Column 1) and entropy balance matching (Column 2) regression results on the association between business strategy and firm performance. All variables are defined in the Appendix. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

An entropy balance matching is estimated to further control for unobservable differences that might be correlated with business strategy and firm performance. In doing so, this study created a dummy variable, *PROSPECTOR*, set to 1 if a firm's *STRATEGY* score is ≥ 24, and 0 otherwise. Next, we matched treatment firms (*PROSPECTOR* = 1) with the control firms (*PROSPECTOR* = 0) on the first three moments – mean, variance, and skewness – of the control variables for the pre-and during-crisis periods and create a synthetic control group. A *t*-test (unreported) confirms that the mean of the control variables across the treatment and control groups after entropy balancing is not significantly different. Column 2 of Table 3

presents the results for this matched sample. The significantly negative coefficient of *COVID* and significantly positive coefficient of *STRATEGY*COVID* indicates that prospectors suffered less reduction in their *ROA*s compared to the defenders during the crisis period. This result rules out the possibility that confounding firm characteristics drive our key finding in Table 2.

4.3. Role of innovation activities

The result that the COVID crisis less impacted the performance of firms with a prospector-type business strategy could be interpreted based on their innovation activities. Reviewing the related literature in Section 2 suggests that prospectors invest more than others in in-house and open innovation activities, which may build dynamic capabilities. Such capabilities may have worked as a mechanism for firms to mitigate the negative impact of the COVID-19 crisis. To test such a possible mechanism, we split the sample based on their investment in R&D (scaled by total assets to address firm size effects). Firms with R&D spending of more than the industry average in a year are categorized into the High R&D group while the remaining are in the Low R&D group.[9] If innovative activities guided prospectors to suffer less than others during the crisis, then we expect the baseline results to be observed only in the High R&D group. Accordingly, we run the baseline regression for the two groups of firms and report the results in Columns 1 and 2 of Table 4.

Table 4. Role of innovation activities

	(1)	(2)
	Low R&D	High R&D
	ROA	ROA
STRATEGY	–0.0026***	–0.0071***
	(0.0007)	(0.0014)
COVID	–0.0239*	–0.0598*
	(0.0135)	(0.0344)
STRATEGY×COVID	0.0015	0.0038*
	(0.0009)	(0.0019)
Control variables	Included	Included
Industry FE	Yes	Yes
Observations	3,184	1,599
Adj. R-Squared	0.745	0.845

Note: This table presents regression results on the role of a firm's investment in R&D influencing the association between business strategy and firm performance. All variables are defined in the Appendix. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The coefficient of *COVID* is significantly negative in both columns, suggesting that firms suffered from a reduction in their performance regardless of their level of R&D spending. The coefficient of *STRATEGY×COVID* in Column 1 for the Low R&D firms is statistically insignificant while significantly positive for the High R&D firms in Column 2. This indicates that firms with High R&D spending and high strategy scores (i.e., prospectors) reported better crisis-period

[9] To have a cleaner setting, firms with missing R&D spending are excluded from this classification.

financial performance. In other words, the joint coefficients of *COVID* and *STRATEGY*COVID* imply that prospectors experienced a smaller reduction in performance during the COVID-19 crisis due to their substantial investments in innovation activities.

5. Discussion

This study examines whether business strategy made a difference in firm performance during the crisis conditions in 2020 and 2021. The results suggest that while all sample firms suffered from a reduction in their performance during the crisis, firms with innovative business strategies (i.e., prospectors) were able to build some resilience to the negative consequences of the COVID crisis. The extant literature provides the following possible explanations for this finding. Prospectors are known for their heavy investment in research and development activities (Hambrick, 2003). Such investment behavior may have created dynamic capabilities that helped them adapt and adjust to the changing operating conditions in times of crisis better than anyone else. Further, prospectors maintain a close connection with their customers (such as through awareness programs) and make more efforts than others to engage in corporate social responsibility (Yuan et al., 2020), which may have disproportionately benefited them, for instance, in the form of customer loyalty and market stability, leading to better performance even in times of crisis.

This study's key finding that business strategy affects firm performance in times of crisis complements the findings in extant literature in the following ways. Prior research shows that firm policies relating to R&D and working capital management, for instance, influenced firm performance during the COVID-19 crisis in 2020. However, they document mixed results on the direction of such influence. For example, while Biswas (2022) finds that firms with high investments in R&D in the pre-crisis period report better performance in 2020, Ahmad et al. (2022) suggest that firms with high liquidity in working capital report low performance in that period. As such, the extant literature is of little help in answering the net/joint impact of a group of firm policies (such as R&D and working capital management). This study provides insights into that question and complements the findings in prior research by creating a bundle of firm policies into a single measure and showing their joint impact on crisis-period firm performance.

This study also highlights the importance of innovative activities. The results that prospectors reported better performance only when they were innovative support the broader literature that the success of innovation activities depends on the strategic alignment between innovation efforts and broader business strategies (e.g., El Chaarani et al., 2022; Ngo, 2023).

6. Conclusions

This study concludes that understanding a firm's business strategy is essential to grasp how its performance will be influenced when a sudden shock to the operating environment occurs. The study enhances theoretical understanding of whether and, if so, how business strategies influence firm performance during crises. This addresses a notable gap in the literature, which has largely focused on normal operating conditions, leaving the role of business strategies during crises underexplored. Furthermore, this study provides empirical evidence that innovative strategies, such as those followed by prospectors, create dynamic capabilities and flexibility, helping firms better adapt to changing operating conditions in times of crisis.

While it may be practical for a firm to follow a particular type of business strategy (such as defender or prospector), this study's findings suggest that they may focus on adopting innovative strategies to foster adaptability to uncertain conditions. For instance, they may continue investing in R&D to enhance their dynamic capabilities, which can reduce the negative impact of crises on firm performance.

Our finding that firms adopting prospector-type strategies – characterized by substantial investments in research and development – demonstrated higher adaptability and sustained performance during the COVID-19 pandemic suggests that dynamic capabilities derived from innovation activities enhance a firm's ability to respond to sudden changes in operating conditions. As such, managers are suggested to prioritize innovative strategies and allocate resources toward continuous innovation to foster resilience during crises.

The findings of this study should be interpreted considering the following limitations. While the calculated business strategy score is based on a comprehensive set of variables, it may not fully capture the nuances of firms' strategic decisions, particularly those beyond the innovative vs. conservative dichotomy. While using quintile rankings in defining business strategy simplifies the scoring process, it may limit the precision of how individual variables influence the overall strategy score. For instance, firms close to the quintile boundaries received similar scores despite differences in their strategic behavior, potentially obscuring subtle variations. In addition, assigning equal importance to all six characteristics may not fully capture their relative contributions to a firm's strategy. Introducing weights for the six characteristics based on their relative impact on firm performance (through factor analysis, for instance) may address such potential issues.

While this study focuses on the COVID-19 crisis, future research may examine the role of business strategies in other similar crises (such as the global financial crisis and/or regional economic crisis). This will allow a comparison of our results with theirs and a better understanding of the dynamic relationship between business strategy and firm performance in times of crisis. Further, exploring how firm size and industry-specific characteristics influence the effectiveness of business strategy would be interesting. When adopting innovative strategies, SMEs may face different constraints and opportunities compared to large companies. Future research may also explore how corporate governance factors (e.g., gender diversity) and CEO characteristics (e.g., risk preferences) shape strategic directions and resilience during crises.

Author contributions

Md Reiazul Haque was key in conceptualizing the study, developing the methodology, and conducting the analysis. All authors contributed to drafting the manuscript and were responsible for reviewing and editing it.

Disclosure statement

Authors have no conflict of interest to declare.

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APPENDIX

Variable Definition

ROA	Net profit before interest and taxes/total assets
STRATEGY	A composite score computed following Bentley et al. (2013)
PROSPECTOR	Dummy variable equal to one if STRATEGY score is ≥24, zero otherwise
COVID	Dummy variable equal to one for firm-year observations in 2020 & 2021 and zero for 2018 & 2019
Firm Size	Log of total assets
Capex	Capital expenditure/sales
Cash	Cash/total assets
Leverage	Total debt/total assets
FCF	Free cash flow/total assets
R&D	Research and development expenditure/total assets
Bod Size	Number of directors on the board
Bod Ind	Independent directors/total directors
Fem Dir	Female directors/total directors
CEO Ten	Log of CEO tenure
Fem CEO	Dummy variable equal to one if the CEO is female, zero otherwise
CEO Age	Log of CEO age