DOANH NGHIỆP LÀM THẾ NÀO ĐỂ TỒN TẠI TRONG ĐẠI DỊCH COVID-19? VAI TRÒ CỦA VỮNG MẠNH TÀI CHÍNH VÀ ĐỔI MỚI

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Tóm tắt

Đại dịch COVID-19 đã gây ảnh hưởng sâu rộng đến nền kinh tế toàn cầu và đáng kể đến hoạt động của các doanh nghiệp, phải đối mặt với vô số thách thức, đặc biệt là về khả năng tài chính. Do đó, các học giả và các bên liên quan ngày càng nhận ra tầm quan trọng hàng đầu của tài chính trong việc đảm bảo sự tồn tại của các công ty. Tuy nhiên, trong thời đại hiện nay được với những biến đổi không ngừng, sự đổi mới đã nổi lên như một yếu tố quyết định quan trọng không kém đối với hiệu quả hoạt động của doanh nghiệp. Dựa trên nghiên cứu thực nghiệm được tiến hành trên mẫu đa dạng gồm 58.484 công ty đến từ 43 quốc gia khác nhau trong giai đoạn 2020 – 2022, nghiên cứu này cung cấp một đánh giá toàn diện về tác động trực tiếp của sự vững mạnh tài chính đến sự tồn tại của doanh nghiệp, đồng thời phân tích vai trò trung gian của sự đổi mới trong mối quan hệ này. Cụ thể, sự sống còn của doanh nghiệp được nghiên cứu bao gồm bốn khía cạnh chính là tình hình hoạt động, hiệu suất bán hàng, khả năng thích ứng và phục hồi lực lượng lao động. Ngoài ra, nghiên cứu còn đi sâu vào đánh giá sự vững mạnh tài chính bằng cách kết hợp ba mặt quan trọng: khả năng tiếp cận tín dụng trước đại dịch, tính thanh khoản và nợ đọng. Hơn nữa, sự đổi mới được xem xét thông qua ba yếu tố then chốt: ra mắt sản phẩm và quy trình mới, cải tiến sản phẩm và quy trình và đầu tư vào nghiên cứu

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và phát triển (R&D). Những phát hiện của nghiên cứu này cho thấy ảnh hưởng tích cực của sự vững mạnh tài chính đối với cả sự tồn tại và đổi mới của doanh nghiệp. Từ đó, phân tích sâu hơn còn cho thấy tác động tích cực của sự đổi mới đối với sự tồn tại của doanh nghiệp.

Từ khóa: sự tồn tại của doanh nghiệp, tài chính bền vững, đổi mới, COVID-19

HOW DO FIRMS SURVIVE THE COVID-19 PANDEMIC? THE ROLE OF FINANCIAL RESILIENCE AND INNOVATION

Abstract

The COVID-19 pandemic has exerted a profound and far-reaching influence on global economies, significantly affecting the operations of firms. Consequently, firms have been confronted with a myriad of challenges, particularly in terms of financial viability. Therefore, scholars and stakeholders have increasingly recognized the paramount importance of financial resilience in ensuring firms' survival. Nonetheless in the contemporary era marked by incessant transformations, innovation has emerged as an equally critical determinant of firms' operational efficacy. Based on an empirical investigation conducted on a diverse sample of 58,484 firms hailing from 43 different countries in the period of 2020 – 2022, this research provides a comprehensive examination of the direct impact of financial resilience on firm survival, while also analyzing the mediating role of innovation in this relationship. Specifically, firm survival is studied encompassing four key aspects, namely the operational status, sales performance, adaptability, and workforce recovery. Additionally, the study delves into the evaluation of financial resilience, incorporating three crucial indicators: pre-pandemic credit access, liquidity, and arrears. Furthermore, innovation is examined through three pivotal factors: new product and process introduction, product and process improvement, and investment in research and development (R&D). The findings of this study indicate a positive influence of financial resilience on both firm survival and innovation. Hence, the analysis reveals a subsequent positive impact of innovation on firm survival.

Keywords: firm survival, financial resilience, innovation, COVID-19

1. Introduction

When an enterprise is established, surviving is the one aspect being prioritized. However, to stay in the competitive and ever-evolving business landscape is not always easy (Silviano, 2008). Moreover, in business, there are many unforeseen circumstances that can significantly impact the survival of a company (Cornaro, 2022). One prime example is the COVID-19 pandemic, which spread throughout the world at the end of 2019. The Bank of International Settlements stated that COVID-19 was probably one of the most economically expensive pandemics ever. It is said that resilience can serve as a useful tool for shocks that are both short- and long-term (Berry et al., 2015). Also, businesses have been encouraged to strengthen

their financial resilience, so they can handle unforeseen events (Cornaro, 2022). Financial resilience is characterized by adaptation, flexibility, and financial robustness (Taylor, 2013). Therefore, this study endeavors to ascertain the influence of financial resilience on the survival of firms.

Moreover, with a high level of flexibility, firms can innovate and increase their chances of surviving amid difficult times. Especially during COVID-19, with a robust financial structure, firms can adapt, innovate, and ensure their long-term sustainability. Innovation is a major aspect in determining an enterprise's operation. Furthermore, most of them only cover how the level of resilience is affected by innovation but not the other way around. That is why we also investigate if the more financially robust a firm is, the more immersed in innovation it is, even amid challenging times like Covid-19.

Several scholars have placed their interest in the relationship between financial resilience and firm survival amid challenging times such as Nkundabanyanga et al. (2019), Atiase et al., (2023); Yet this research introduces unique aspects that are not typically found in other studies. Firstly, this study investigates the black swan event of COVID-19 global pandemic. As amending limitations from past research, we reintroduce the new concept of financial resilience to provide a more definitive perspective on the research question, and a newer and more updated perspective on how businesses should navigate the modern market setting to ensure their survival. Secondly and most significantly, we incorporate innovation as a mediating factor in the relationship between financial resilience and firms' survival outcomes. Through this new approach, we can give recommendations to firms, policymakers, and investors as it proves to be useful in strategic decision-making concerning their benefits.

2. Literature review

2.1. Firm survival

There are many variations in how firm survival has been defined and measured (Schwartz, 2012). Inspired by previous studies, this research has surviving firms denoted based on criteria including current firm status (Cefis & Marsili, 2023) and the firm performance (Siepel & Dejardin, 2020). Moreover, the adaptability derived from the previous articles such as Tuominen et al. (2004); Reeves and Deimler (2015) and the firm expectation to return to the normal level of sales and workforce (Khan et al., 2022) in firm success and survival has also been considered in the research.

2.2. Financial resilience

Given the broad nature of financial resilience (Salignac et al., 2019), this study shall explore 3 aspects of financial resilience which are pre-pandemic credit access, liquidity, and ability to pay debts. Access to credit is the use of loan or line of credit to financial institutions. Besides, cash flow availability is one of crucial factors to be aware (Dirman, 2020; Hu et al., 2022). Finally, solvency is a financial assurance of the ability to pay debts, influencing financial resilience (Grable et al., 2013; Mulyantini et al., 2020).

2.3. Impact of financial resilience on firm survival

Financial constraints can undoubtedly have a significant impact on a company's ability to expand and compete in the market (Musso & Schiavo, 2007). Thus, finance resilience enables current

businesses to take advantage of investment and expansion opportunities and to reach larger equilibrium sizes. In addition, businesses can also pick more effective organizational structures like incorporation and securely build up a portfolio of more productive assets (Beck, 2016).

2.4. Innovation

Firms that successfully innovate can adapt to dynamic market conditions, outperform their competitors, and achieve long-term sustainability (Baumöhl & Kočenda, 2022; Dai et al., 2020). Innovation can be defined as the overall capability of an organization to launch new products or expand into new markets by combining operational strategy with innovative processes (Wang & Ahmed, 2004). In this article, the definition and measurement of firm innovation concentratedly focus on R&D investment as innovation input and the overall capability of a firm to develop and launch new products and process.

2.5. Mediating role of Innovation in the relationship between Financial Resilience and Firm Survival

To pursue innovation, a company's working capital sources and financial structure need to be stable (Aidoo, 2019). Businesses should be able to support their innovation with a range of funding sources and flexible loan terms. Moreover, issues like insufficient cash make it difficult to launch and advance such development (Evans & Jovanovic, 1989). It is also found that leverage and innovation interact significantly. Due to high debt levels, firms are less likely to innovate (Geelen et al., 2021). When firms are able to embrace innovation, they are better positioned to adapt to rapidly changing market conditions and can thrive even in uncertain situations so this can give them a competitive advantage over their competitors (Dai et al., 2019; Baumöhl & Kočenda, 2022).

2.6. Hypothesis Development

As financially resilient firms are found to have better financial stability, capacity for forecast, awareness, adaptability, and capacity for recovery, qualities which affect a company's ability to thrive in an unpredictable marketplace and stimulate responses to financial shocks (Taylor, 2013).

H$_1$: Financial resilience is likely to have a positive impact on Firm survival.

A robust financial system, which represents high financial resilience, plays a vital role in adopting innovation by providing firms with resources in need (O'Sullivan, 2005). Such firms possess both internal and external resources to allocate towards innovation initiatives and are more likely to invest in R&D activities and technology (Brown & Eisenhardt, 1995). They also can establish inter-organizational networks and partnerships (von Hippel, 1986; Carbonell et al., 2009; Wynstra et al. 2010), fostering innovation processes. Besides, there is a positive correlation between firm's focus level on innovation and their chance of survival (Miocevic & Shroj, 2023, Khan et al., 2023). Thus, to test the mediating role innovation, we build the hypothesis as follows:

H$_{2a}$: Financial Resilience is likely to have a positive impact on Firm Innovation.

H$_{2b}$: Firm Innovation is likely to have a positive impact on Firm Survival.

3. Methodology

3.1. Sample and Data

The research incorporates data from two sources: the World Bank Enterprise Survey (WBES), which was updated in May 2023 with 200,000 interviews across 155 economies, and the World Bank COVID-19 Enterprise Follow-up Surveys (CEFS), which was updated in October 2022. Comprehensively, WBES includes business environment information such as competition, regulations, crime, infrastructure, and financial access while CEFS focuses on firm operations, employment, access to finance, trade, and investment during COVID-19. Using the unique identifications which are assigned by the World Bank for each firm, we integrated two standardized datasets to have the sample consisting of 58,484 observations from 43 different nations from 2020 to 2022.

3.2. Research model

3.2.1. Impact of financial resilience on firm survival

To understand and test hypothesis H_1 about the influence of finance on business survival, we build equation model inspired by models of Özşuca (2023), Khan et al. (2022), Mulyantini et al. (2020), Hu et al. (2022), Dirman (2020), Salignac et al. (2019). Thus, this model has the following form:

$$SUV_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 F\_Controls_{it} + \alpha_3 M\_Controls_{it} + Country\_FE_i + Year\_FE_t + \varepsilon_{it}$$
(I)

Where $SUV_{i,t}$ is the representative for firm survival which comprises four variables: operation status (SUV_STS), sales performance (SUV_SLS), adaptation index (SUV_APT), workforce recovery anticipation (SUV_EWF); $FIN_{i,t}$ is the explanatory variable acting for financial resilience via four factors: access to credit (FIN_CRE), liquidity (FIN_LIQ), adaptability (FIN_APT) and firm's anticipation meeting outstanding debts (FIN_ARR). Meanwhile, α_1 is the coefficient for the variable $FIN_{i,t}$, while α_2, α_3 represents the coefficients for control variables F_Controls representing firm characteristics, M_Controls representing characteristics of managers, respectively and α_0 is the regression intercept. Finally, i represents firm, t represents the year of survey; and $\varepsilon_{i,t}$ represents the measurement errors. In consistent with H1, we expect α_1 to be positive ($\alpha_1 > 0$), implying a positive linkage between the explanatory and response variables.

3.2.2. Mediating impact of innovation

Inspired by the modeling construction of Baron et al. (1986) and King and Levine (1993), we build the mediating role of innovation through firstly direct impact of firms' financial resilience on innovation and in turn, innovation influence firm survival itself. The below research model is to investigate the impact of financial resilience on innovation as follow:

$$INV_{it} = \beta_0 + \beta_1 FIN_{it} + \beta_2 F\_Controls_{it} + \beta_3 M\_Controls_{it} + Country\_FE_i + Year\_FE_t + \varepsilon_{it}$$
(2)

Similar with Model I, we utilize $FIN_{i,t}$ to be the independent variable. $INV_{i,t}$ is the dependent variable indicating innovation of firms which includes three aspects: R&D expenditure (INV_R&D) and introduction/improvement of products (INV_PROD) and processes (INV_PROC. $\beta_1, \beta_2, \beta_3, \beta_4$ represents the regression intercept. We expect β_1 to be positive in line with hypothesis H_{2a}.

Correspondingly, following model focus on the effect of innovation levels on firm survival as follow:

$$SUV_{it} = \gamma_0 + \gamma_1 INV_{it} + \gamma_2 F\_Controls_{it} + \gamma_3 M\_Controls_{it} + Country\_FE_i + Year\_FE_t + \varepsilon_{it}$$
(3)

Similar to two above model, SUV_{it}, which consists of SUV_STS, SUV_SLS, SUV_APT, SUV_EWF and $INV_{i,t}$, via INV_R&D, INV_PROD and INV_PROC. γ_1, γ_2, $\gamma_{3,}\gamma_4$ are regression intercept and coefficients of independent variables and controls, respectively. We expect a positive result of γ_1 as consistent to hypothesis H$_{2b}$.

3.3. Variable measurement

3.3.1. Dependent variable – Firm survival

Derived from the literature review, our research develops four components for firm survival variables. SUV_STS is the indicator for firm status; SUV_SLS refers to the firm performance, which measures the sales' volatility in different time scales. Learning from Tuominen et al. (2004) and Reeves and Deimler (2011), SUV_APT is a variable representing firm adaptability, which indicates an adaptability index taking the average value of total firm adaptation activities. Meanwhile, SUV_EWF - a dummy indicating whether firm expects to return to normal level of workforce or not.

3.3.2. Independent variables – Financial resilience

Besides, we emphasized the importance of examining the firms' reliance on both internal and external resources when studying financial resilience during the COVID-19 pandemic. Thus, financial resilience consisting of 3 proxies will influence the dependent variable - firm's survival. FIN_CRE is a firm's access to credit/loan before the pandemic started. Learning from models of Dirman (2020) and Hu et al. (2022), FIN_LIQ refers to when the firm has experienced increased liquidity or cash flow availability since Covid-19 started. Meanwhile, FIN_ARR represents whether firms had the expectation of not failing in arrears.

3.3.3. Mediating variables

Innovation has been chosen as the mediating variables. Khan et. al (2022) argued a positive influence of innovation upon companies' survival. For the innovation activities, INV_PROD is the introduction of new or improved products or services in response to COVID-19 whereas INV_PROC is the introduction of the new or significant business processes during the 3-year period; INV_RD represents "firms spending on research and development during the last fiscal year, excluding market", consistent with models from Reinmoeller and Baardwijk (2005), and Parast and Kamalahmadi (2019).

3.3.4. Control variables

Firm characteristics and manager traits are useful predictors for the firm's survival. We control seven characteristics of businesses: F_SIZE is the firm size; F_TRAI refers to the formal training programs for permanent, full-time employees in the last fiscal year; F_OWN is the type of ownership if the firm is owned by foreigners or not; F_QUAL refers to firms' ability to meet international production standards; F_AGE is the firm age, which is measured by the natural logarithm of the number of years. Meanwhile, F_SEC denotes the sector in which the firms are classified, F_EXPO implies whether the firm exports or not. Additionally, manager traits have shown a positive influence

on the financial performance of companies during times of crisis. Female, denoted M_FEM as a design variable, as discussed by Wilson et al. (2013), and Cahan et al. (2015), is expected to have a positive influence on the financial performance of companies. M_EXP indicates managerial experience, which is measured by the number of years of experience top managers have working in their sectors. Given that countries' policies towards pandemic control may have an influence on our results, we also control the year and country with dummy variables.

Table 1: Sources and description of study variables

Variables	Preference	Notation	Description
Firm Survival (SUV)			
Firm Status	Khan et al. (2022), Özşuca (2023)	SUV_STS	Current firm status: Open (=3); Temporarily close (=2); Permanently close (=1)
Firm Performance	Khan et al. (2022), Heredia et al. (2022)	SUV_SLS	Change in monthly sales compared to one year ago: Increased (=3); No change (=2); Decreased (=1)
Firm Adaptability	Özşuca (2023)	SUV_APT	Adaptability Index (Increasing delivery of goods, services, or carry-out; adjusting or converting their production or services, starting or increasing online business activity, and starting or increasing remote work)
Firm Expectation	Khan et al. (2022)	SUV_EWF	Firm expects to return to normal level of workforce (=1); otherwise (=0)
Financial Resilience (FIN)			
Credit access	Salignac et al. (2019)	FIN_CRE	Firm has a line of credit or loan: No credit access (=1); Non-mainstream credit (Non-bank financial institution & other) (=2); Mainstream credit (Commercial bank, State-owned banks/Government agency) (=3)
Liquidity	Dirman (2020) Hu et al. (2022)	FIN_LIQ	Firm ever have experienced liquidity or cash flow availability since COVID-19 began: Decreased (=1); Fluctuated (=2); No change (=3); Increased (=4)
Arrears Anticipation	Mulyantini and Jubaedah (2020)	FIN_ARR	Firm that anticipate falling in arrears on outstanding liabilities (=1); otherwise (=0)
Innovation (INV)			
Product innovation	Khan et al. (2022) Özşuca (2023)	INV_PROD	During last 3 years, firm introduced new/significantly Improved Product (=1); otherwise (=0)
Process innovation	Khan et al. (2022) Özşuca (2023)	INV_PROC	During last 3 years, firm introduced new/significantly Improved Process (=1); otherwise (=0)
R&D	Özşuca (2023)	INV_RD	During the Fiscal Year, firms spent on R&D, excluding market research (=1); otherwise (=0)
Firm Characteristics (F_Controls)			
Firm size	Khan et al. (2022)	F_SIZE	Number of employees: Large (> 100) (= 3); Medium (20-99) (=2); Small (<20) (= 1)

Variables	Preference	Notation	Description
Firm sector	Özşuca (2023)	F_SEC	Firm belongs to manufacturing sector (=1); service sector (=0)
Foreign ownership	Khan et al. (2022) Özşuca (2023)	F_OWN	Firm is owned by foreign individuals, companies or organizations (=1); otherwise (=0)
Exporter	Khan et al. (2022) Özşuca (2023)	F_EXPO	Firm exports, (=1); otherwise (=0)
Training (Employee quality)	Khan et al. (2022)	F_TRAIN	Formal training programs for permanent, full-time employees in last fiscal year (= 1); otherwise (=0)
Firm quality	Khan et al. (2022)	F_QUAL	Firms specify the internationally recognized quality Certifications (=1); otherwise (=0)
Location	Sidorkin and Srholec (2014) Özşuca (2023)	F_LOC	Located in location with population: > 1 million (= 4); 250.000 - 1 million (= 3); 50.000 -250.000 (= 2); < 50.000 (= 1)
Firm age	Sidorkin and Srholec (2014) Khan et al. (2022)	F_AGE	Natural logarithm of the number of operation years of the firm
Manager Characteristics (M_Controls)			
Female top manager	Khan et al. (2022), Özşuca (2023)	M_FEM	At least 1 top manager is female (=1); otherwise (=0)
Managerial experience	Khan et al. (2022) Özşuca (2023)	M_EXP	Number of years of experience top managers have working in this sector
Other factors			
Countries	Sidorkin and Srholec (2014)	C_Controls	43 countries
Year		Y_Controls	Year 2020, 2021, 2022

Source: Synthesized by the author (2024)

3.4. Regression Method

Since most of the dependent variables in our model are ordinal and binary, we apply the ordered logit and bivariate logit regression applied by Hensher and Jones (2007), Jones and Hensher (2004), Robson and Bennett (2000) for predicting default, survival, and distresses. For a binary dependent variable, we use bivariate logit regression which was also utilized by Gupta et al. (2018), Åstebro and Winter (2012), Wood (2006) to investigate firm survival and performance and applied by Abdu and Jibir (2018), Bronzini and Piselli (2016), Hussen and Çokgezen (2020) to study innovation. Therefore, this research applies ordered logit regression to test for the following dependent variables representing firm survival: firm status (SUV_STS) and firm performance (SUV_SLS). With respect to the last dependent variable - firms' expectation of the workforce recovery (SUV_EWF) and 3 mediating variables demonstrating innovation R&D investment - INV_RD, product/process introduction or improvement - INV_PROD/INV_PROC, we implement bivariate logit regression

while such variable as adaptability index (SUV_APT) representing numeric value so pooled OLS regression is required.

3.5. Robustness Check

To enhance the robustness of research findings, it is possible to employ alternative proxies for the corresponding variables (Khan et al., 2022). Therefore, we adopt various proxies to assess the firm survival, financial resilience, and innovation dimensions as shown in Table 1.

4. Results and discussion

4.1. Results

4.1.1. Descriptive statistics

Table 2: Summary of descriptive statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	**N**	**Mean**	**Std.Dev.**	**min**	**max**
Dependent variables – Firm Survival					
SUV_STS	36,247	2.95	0.21	2.00	3.00
SUV_SLS	36,247	1.59	0.74	1.00	3.00
SUV_APT	36,247	0.35	0.31	0.00	1.00
SUV_EWF	36,247	0.83	0.37	0.00	1.00
Independent variables – Financial Resilience					
FIN_CRE	36,247	1.81	0.98	1.00	3.00
FIN_LIQ	36,247	1.74	1.06	1.00	4.00
FIN_ARR	36,247	0.69	0.46	0.00	1.00
Mediating variables – Innovation					
INV_PROD	36,247	0.30	0.46	0.00	1.00
INV_PROC	36,247	0.17	0.38	0.00	1.00
INV_RD	36,247	0.13	0.33	0.00	1.00
Control variables – Firm Characteristics					
F_SIZE	36,247	1.74	0.77	1.00	3.00
F_SEC	36,247	0.52	0.50	0.00	1.00
F_OWN	36,247	0.10	0.30	0.00	1.00
F_EXPO	36,247	0.22	0.41	0.00	1.00
F_TRAI	36,247	0.35	0.48	0.00	1.00
F_QUAL	36,247	0.27	0.44	0.00	1.00

	(1)	(2)	(3)	(4)	(5)
VARIABLES	**N**	**Mean**	**Std.Dev.**	**min**	**max**
F_AGE	36,247	2.94	0.66	0.69	5.33
F_LOC	36,247	2.10	1.26	0.00	4.00
Control variables – Manager Characteristics					
M_FEM	36,247	0.18	0.38	0.00	1.00
M_EXP	36,247	21.02	11.76	1.00	70.00

Note: Table 2 demonstrates descriptive statistics of dependent variables – Firm Survival consist of SUV_STS which is the firm status of operating whether open or temporarily close or permanent close, SUV_SLS which is the average change in monthly sales compared to 1 year ago, SUV_APT which is index for adapting activities responding to COVID-19, SUV_EWF which is whether firms expected to recover the same work force as before COVID-19; independent variables – Financial resilience include FIN_CRE which is the credit access of firms before COVID-19, FIN_LIQ which is liquidity movement during COVID-19, FIN_ARR which is whether firms expect not to fail arrears; mediating variable comprise INV_PROD, INV_PROC, INV_RD which are dummies respectively whether firms introduce new/improved products/services, process, spend money on R&D. For details of control variables, see Table 1 - Sources and description of study variables.

Source: The authors (2024)

In Table 2, the mean of firm status and firm sales indicates that most firms were close to being currently opened rather than temporarily closed and there was a higher likelihood of a decline or no change in sales. In response to COVID-19, there is a mean adaptability index of 0.35 showing that most firms only engaged in about 1 of the 4 adaptation activities. Besides, 83% of the firms anticipated a return to the normal workforce.

Followingly, the mean of independent variables depicts showing that most firms either had no access to credit or only accessed to non-mainstream sources pre-pandemic and liquidity during COVID-19 experienced mostly volatility and falls. Furthermore, 69% of firms had the expectation of paying out arrears.

Meanwhile, considering innovation as mediating variables, only a few firms innovated before the breakout of COVID-19, as evidenced that only 30% and 17% of firms developed new/improved products and processes respectively and only 13% invested in R&D.

Regarding control variables representing firm characteristics, small and medium-sized businesses (SMEs) make up the majority and the average age of sample firms is between 18 and 19 years, most of which are in the areas of 50,000 - 250,000 citizens. In addition, the manufacturing sector accounts for 52% of firms, whilst the service industry represents 48%, only 22% are exporters, 10% is related to foreign ownership, 35% of the firms involve formal training for staff, and 27% of them hold globally recognized quality certifications. Relating to traits of managers, average senior management experience is 21 years while only 18% are female.

Table 3: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) SUV_STS	1.00									
(2) SUV_SLS	0.14	1.00								
(3) SUV_APT	0.04	0.08	1.00							
(4) SUV_EWF	0.06	0.10	-0.07	1.00						
(5) FIN_CRE	0.03	0.05	0.03	0.03	1.00					
(6) FIN_LIQ	0.12	0.52	0.00	0.12	0.06	1.00				
(7) FIN_ARR	0.12	0.20	-0.01	0.25	0.01	0.21	1.00			
(8) INV_PROD	0.01	0.03	0.13	-0.04	0.14	0.04	0.01	1.00		
(9) INV_PROC	0.00	0.03	0.09	-0.03	0.15	0.05	0.00	0.32	1.00	
(10) INV_RD	0.02	0.05	0.08	-0.01	0.13	0.05	0.04	0.23	0.23	1.00

Note: Table 3 demonstrates correlation of main variables: dependent variables – Firm Survival consist of SUV_STS which is the firm status of operating whether open or temporarily close or permanent close, SUV_SLS which is the average change in monthly sales compared to 1 year ago, SUV_APT which is index for adapting activities responding to COVID-19, SUV_EWF which is whether firms expected to recover the same work force as before COVID-19; independent variables – Financial resilience include FIN_CRE which is the credit access of firms before COVID-19, FIN_LIQ which is liquidity movement during COVID-19, FIN_ARR which is whether firms expect not to fail arrears; mediating variable comprise INV_PROD, INV_PROC, INV_RD which are dummies respectively whether firms introduce new/improved products/services, process, spend money on R&D.

To investigate the connections among the variables in our investigation, we generated a correlation matrix to evaluate the magnitude and orientation of the correlations, which is displayed in Table 3. On the whole, the correlation analysis reveals that none of the variables exhibit a correlation exceeding 0.7, thus, it suggests a favorable indication, indicating that the variables under study possess a shared similarity of less than 50% (Shao et al., 2022) Therefore, this underscores the distinctiveness and relatively independent nature of the examined variables, thereby providing a valuable insight into the diverse dimensions and unique characteristics they encompass.

4.1.2. Regression results

a) Firms with financial resilience are more likely to survive through COVID-19

Consistent with hypothesis H_1, predicting firms with financial resilience will be more likely to survive through COVID-19, the model is represented by twelve specific columns, which are marked from (1) to (12) in Table 4. Specifically, three proxies for financial resilience are shown in the first

three rows as independent variables which are pre-pandemic credit access, liquidity, and not-failing-arrears expectation. Each of the four columns among twelve reflects the four components of survival which are operation status, sales performance, adaptation, and workforce recovery expectation.

Regarding access to credit, model (1) to (4) indicate the impact of firm access to credit before COVID-19 is statistically significant with positive sign with 3 out of 4 proxies which are (1) SUV_STS representing firm status, (4) SUV_EWF representing firm expectation about workforce recovery with 90% confidence level, and (3) SUV_APT which is firm adaptability with 99% confidence level, apart from (2) SUV_SLS representing firm performance. Consistent to our results, the findings made by Musso and Schiavo (2008) also shows that firms' employment was positively impacted by having access to external financing; and those of Castaldo et al. (2023), centering on start-up firms also demonstrated a higher sharing of bank financing in fundings reduces the risk of firm failures during COVID-19. In general, these results show a statistically significant positive relationship showing that businesses with strong financial resilience are more likely to endure and survive COVID-19 difficulty, which is consistent with H_1.

Since bank-loan-accessible firms are much more likely to modify their operations to adapt to the COVID-19 pandemic (Khan, 2022). The reason is when a firm can access appropriate credit resources, this contributes to minimizing undesirable challenges, thereby ensuring the stability of cash flow, and fostering sustained funding relationships. By securing adequate credit, firms can effectively mitigate financial constraints and enhance their capacity to meet ongoing financial obligations. In more detail, COVID-19 pandemic's simultaneous supply and demand shock led to a sudden and sharp decline in business revenues, as well as diminishing cash flows and depleting working capital (Didier et al., 2021). Banks are hesitant to lend to borrowers with low credit quality and low asset values, which makes it more difficult for businesses that desperately need liquidity to receive credit. In accordance with theories of impaired access to bank credit, firms who did not have credit constraints prior to the crisis are probably going to have easier access to bank funding than those that did face credit rationing (Khan, 2022).

As shown in model (5) to (8) demonstrating the impact of liquidity on the firm survival, there is positive significant sign of FIN_LIQ – firm liquidity availability to three firm survival indicators which are (5) SUV_STS, (6) SUV_SLS and (8) SUV_EWF with confidence level of 99%, apart from (7) SUV_APT. In a comparable manner, Fang et al., (2022) demonstrated the advantageous effect of stable liquidity on their survival and sales growth and Shaharuddin et al., (2021) discovered favorable influence of liquidity on businesses' performance during the COVID-19 pandemic. During the pandemic, financial institution credit restrictions forced numerous firms into a liquidity crunch. Distresses from reduced profit margins and uncertain revenue leading to the restriction to external credit grant and a rising demand for liquidity to continue obligations to suppliers, landlords, and staff put firms under financially difficult situation with a serious shortage of liquidity (Özşuca, 2023). Liquidity is an establishment's ability to conveniently pay off its short-term financial obligations. Therefore, having large amounts of cash on hand indicates that companies can pay their debts on time and avoid defaulting (Azhar, 2013; Ejike and Agha, 2018; Raykov, 2017). Firms may be greatly exposed to unforeseen costs or interruptions to their revenue sources during a period of COVID-19 and, thus, only be able to meet their immediate financial obligations, such as paying employee salaries, covering rent, utilities, and other essential expenses upon their ability to maintain adequate liquidity.

Finally, the last aspect of financial resilience – FIN_ARR demonstrates firm expectations of not falling in arrears appear with positive sign for all firm survival proxies with confidence of 99% in model (9) to (12). Similarly, the presence of arrears, notably wage arrears, exhibits a negative correlation with business performance in Earle and Sabirianova (2002) and Sprenger (2014) indicate that arrears serve as a robust indicator of firm insolvency and liquidation, and it is observed that firms burdened with substantial tax arrears are more susceptible to bankruptcy (Lukason & Andresson, 2019; Kohv, 2020). Arrears are "late payment" serve as a buffer for a company's liquidity issues in the event of financial trouble by replacing the prior pay-off arrears with mostly equal fresh inflow of arrears over a medium-term period because paying debts late has a lower cost than using alternative sources of financing; however, arrears are regarded as "bad debts" in the context of businesses experiencing severe financial difficulties as they are not able to be paid in whole or in the near future (Alfandari & Schaffer, 1996; Schaffer, 1998).

Table 4: Regression results: the impact of financial resilience on firm survival

VARIABLES	(1) SUV_STS	(2) SUV_SLS	(3) SUV_APT	(4) SUV_EWF	(5) SUV_STS	(6) SUV_SLS	(7) SUV_APT	(8) SUV_EWF	(9) SUV_STS	(10) SUV_SLS	(11) SUV_APT	(12) SUV_EWF
FIN_CRE	0.0382*	-0.0008	0.0076***	0.0190*								
	[0.0195]	[0.0115]	[0.0014]	[0.0105]								
FIN_LIQ					0.6817***	1.0798***	-0.0006	0.2826***				
					[0.0408]	[0.0117]	[0.0015]	[0.0179]				
FIN_ARR									2.3507***	0.9401***	0.1955***	3.1876***
									[0.0448]	[0.0264]	[0.0025]	[0.0277]
F_SIZE	0.2992***	0.1760***	0.0306***	-0.0460***	0.2364***	0.0956***	0.0529***	-0.0259	0.2488***	0.1577***	0.0301***	-0.1074***
	[0.0279]	[0.0160]	[0.0019]	[0.0143]	[0.0411]	[0.0172]	[0.0022]	[0.0250]	[0.0287]	[0.0159]	[0.0017]	[0.0174]
F_SEC	0.2003***	-0.0332	-0.0122***	0.0976***	0.3236***	0.0078	-0.0291***	0.0115	0.2277***	-0.0343	-0.0152***	0.0822***
	[0.0370]	[0.0237]	[0.0027]	[0.0209]	[0.0558]	[0.0255]	[0.0033]	[0.0359]	[0.0384]	[0.0238]	[0.0026]	[0.0255]
F_OWN	-0.1274**	0.1086***	0.0107**	-0.0314	-0.1482*	0.0343	0.0214***	0.1770***	-0.2823***	0.0690*	0.0033	-0.1250***
	[0.0645]	[0.0372]	[0.0044]	[0.0337]	[0.0894]	[0.0400]	[0.0052]	[0.0600]	[0.0664]	[0.0369]	[0.0041]	[0.0410]
F_EXPO	0.1045*	0.1286***	0.0017	0.0164	-0.0172	0.0806***	0.0050	0.0079	0.0832	0.1176***	0.0013	0.0050
	[0.0547]	[0.0285]	[0.0034]	[0.0266]	[0.0779]	[0.0307]	[0.0041]	[0.0474]	[0.0558]	[0.0285]	[0.0032]	[0.0321]
F_TRAI	0.2614***	0.0583**	0.0373***	0.1200***	0.0813	0.0071	0.0418***	0.0731*	0.2473***	0.0641***	0.0339***	0.1019***
	[0.0420]	[0.0240]	[0.0028]	[0.0220]	[0.0595]	[0.0258]	[0.0034]	[0.0385]	[0.0431]	[0.0240]	[0.0027]	[0.0267]
F_QUAL	0.3846***	0.1411***	-0.0001	0.0285	0.3991***	0.0508*	0.0027	0.0867*	0.2688***	0.1187***	-0.0031	-0.0240
	[0.0571]	[0.0280]	[0.0034]	[0.0262]	[0.0835]	[0.0303]	[0.0040]	[0.0493]	[0.0577]	[0.0280]	[0.0032]	[0.0316]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
F_AGE	0.2620***	-0.0095	0.0047**	0.1001***	0.1456***	-0.0361*	-0.0053*	0.0006	0.2475***	-0.0178	-0.0000	0.0305
	[0.0308]	[0.0198]	[0.0023]	[0.0176]	[0.0456]	[0.0214]	[0.0027]	[0.0309]	[0.0317]	[0.0199]	[0.0021]	[0.0213]
F_LOC	-0.0251	-0.0389***	0.0120***	-0.0245**	0.0094	-0.0128	0.0192***	0.0097	-0.0200	-0.0391***	0.0127***	-0.0127
	[0.0179]	[0.0117]	[0.0013]	[0.0102]	[0.0258]	[0.0126]	[0.0016]	[0.0177]	[0.0186]	[0.0117]	[0.0013]	[0.0123]
M_FEM	-0.2585***	-0.0502*	0.0070**	-0.0863***	-0.2902***	0.0013	0.0165***	-0.1074**	-0.1843***	-0.0160	0.0129***	-0.0078
	[0.0428]	[0.0281]	[0.0033]	[0.0247]	[0.0609]	[0.0303]	[0.0040]	[0.0423]	[0.0449]	[0.0282]	[0.0031]	[0.0304]
M_EXP	0.0034*	-0.0007	-0.0003**	0.0047***	0.0026	-0.0019	-0.0010***	-0.0025	0.0025	-0.0011	-0.0005***	0.0027**
	[0.0019]	[0.0011]	[0.0001]	[0.0010]	[0.0027]	[0.0012]	[0.0002]	[0.0017]	[0.0019]	[0.0011]	[0.0001]	[0.0012]
Constant			0.1727***	0.7825***			0.2046***	1.1665***			0.1189***	0.3450**
			[0.0164]	[0.1312]			[0.0174]	[0.1706]			[0.0154]	[0.1476]
Observations	40,613	36,895	55,194	55,194	37,349	36,969	37,369	37,268	41,433	37,643	56,308	56,308
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared				0.0996				0.1539				0.1894

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in square brackets. Table 4 shows the estimation results of model: SUV_STS is the firm status of operating whether open or temporarily close or permanent close; SUV_SLS is the average change in monthly sales compared to 1 year ago; SUV_APT is index for adapting activities responding to COVID-19; SUV_EWF is whether firms expected to recover the same work force as before COVID-19; FIN_CRE is the credit access of firms before COVID-19, FIN_LIQ is liquidity movement during COVID-19, FIN_ARR is whether firms expect not to fail arrears; others are control variables divide into 2 categories: Firm characteristics includes F_SIZE based on the number of employees, F_SEC comprised 2 sectors manufacturing and service, F_OWN is whether the firm is foreign-owned, F_EXPO is whether the firm export, F_TRAIN is whether the firm has training program for employees, F_QUAL is whether the firm has internationally recognized quality certification, F_LOC is the population of where the firm is located, F_AGE equals ln(firm's operation years); Other controls are classified into Manager characteristics following by M_FEM is whether the firm has female managers and M_EXP is the number of sector-related experience years of top manager

b) Mediating role of innovation in the relationship between financial resilience and firm survival

Table 5 presents the results of bivariate logit regression analysis, examining the relationship between financial resilience and innovation. The table displays three financial resilience variables in the first three rows, each corresponding to a specific regression model. These models are associated with a set of three independent variables, namely innovation. Most of the results are consistent with H_{2a}.

The first three columns of Table 5 explain the coefficients of FIN_CRE, with a 99% confidence level, are statistically significant in all INV_PROD, INV_PROC, and INV_RD. It means that when businesses have access to credit—especially formal external credit—they are more likely to carry out their innovation. The works of Giannakas and Fulton (2005); and Bertschek (1995) are also in line with our research. Finance is an essential part of innovation processes. Financial restrictions often lead to companies pursuing more conservative projects, as evidenced by the work of Nanda & Nicholas, 2014. Therefore, it seems sense that businesses might steer clear of high-risk or high-investment projects like research and development unless they have a reliable, official source of funding. That is the reason why for businesses, having access to finance can act as a safety net, enabling them to take calculated risks without worrying about facing dire financial repercussions right away. This freedom to try new things pushes businesses to validate cutting-edge ideas and embark on innovative projects that may provide innovations and competitive benefits.

Model (4) to (5) in Table 5 indicates that the impact of liquidity is statistically significant with the positive sign of 3 proxies on the innovative activities at a 99% confidence level. The results align closely with H_{2a}. Similarly, Pham et al. (2018) demonstrated a positive relationship between the cash holdings and innovation. With financial looseness, organizations can remain agile and innovative, positioning themselves to capitalize on opportunities that may arise amid financial shocks. Thus, one way to make sure you have enough resources is to maintain financial looseness in liquidity (Brealey et al., 2014). Otherwise, firm development when faced with liquidity issues could negatively impact innovation and growth rates (Cunat, 2007). Moreover, availability of sufficient financial resources grants businesses the flexibility to make substantial investments in innovation-related projects (Schumpeter, 1912).

Subsequently, the final three columns of Table 5 show the significant positive impact of debt arrears on innovation in two aspects: product innovation and R&D investment with the confidence level of 99%. A McKinsey & Company survey indicates that many businesses are deprioritizing innovation in favor of other strategies (Am et al., 2020). Therefore, when a business is trying to minimize expenditures, R&D is sometimes one of the first areas to be sacrificed (Yovchev, 2020). It suggests that if businesses do not expect to get behind on their existing debts, they will have a positive outlook on their financial situation and expect to turn strategy to innovation.

Table 6 reports the ordered logit regression results of innovation's impact on firms' survival capability. Three innovation variables are displayed in three different rows, representing every of three regression models, corresponding with the set of 4 survival variables. Overall, the outcomes suggest that the existence of innovation has a significant and positive effect on firm survival, in accordance with H_{2b}.

The results show any product introduction or improvement has a highly statistically significant influence opening status, adaptation, and their expectation on their ability to return to normal workforce with confidence level of 99% while it is 90% for sales performance. Regarding process innovation, it also demonstrates its positively significant relationship to adaptation, workforce recovery expectation with confidence level of 99% and to operation status at significance level of 95%. Yet, there is no impact on sales performance. In contrast, R&D investment has a positive influence on all aspects significantly. There are some research having similar findings such as Lee et al. (2014), Miocevic and Shroj (2023). Innovators run a higher chance of sustaining themselves as they can prosper even in unsettling circumstances and are better equipped to adjust to quickly shifting market conditions. In detail, they can quickly develop their products, services, and strategy to satisfy changing demands from customers (Özşuca, 2023; Bartik et al., 2020). They also can experience extra cost reductions while being able to reach higher efficiency in operations (Muzi et al., 2021). Therefore, their ability to bounce back from unfavorable times could offer an edge over rivals and help them pull through economic shocks (Christensen, 1997; Dai et al., 2019; Baumöhl & Kočenda, 2022).

Table 5: Regression results: the impact of financial resilience on innovation

VARIABLES	(1) INV_PROD	(2) INV_PROC	(3) INV_RD	(4) INV_PROD	(5) INV_PROC	(6) INV_RD	(7) INV_PROD	(8) INV_PROC	(9) INV_RD
FIN_CRE	0.1796***	0.2696***	0.2718***						
	[0.0111]	[0.0135]	[0.0153]						
FIN_LIQ				0.0310***	0.0414***	0.0445***			
				[0.0118]	[0.0142]	[0.0158]			
FIN_ARR							0.1006***	0.0416	0.1254***
							[0.0215]	[0.0262]	[0.0296]
F_SIZE	0.0735***	0.1415***	0.3538***	0.0794***	0.1816***	0.3739***	0.0929***	0.1922***	0.3806***
	[0.0154]	[0.0187]	[0.0209]	[0.0182]	[0.0221]	[0.0246]	[0.0151]	[0.0182]	[0.0204]
F_SEC	0.3817***	0.4519***	0.3357***	0.3540***	0.4712***	0.3528***	0.3763***	0.4375***	0.3188***
	[0.0230]	[0.0283]	[0.0323]	[0.0273]	[0.0338]	[0.0383]	[0.0227]	[0.0279]	[0.0319]
F_OWN	0.1022***	0.0882**	0.0220	0.0187	-0.0042	-0.0242	0.0430	-0.0077	-0.0410
	[0.0341]	[0.0394]	[0.0423]	[0.0408]	[0.0474]	[0.0498]	[0.0335]	[0.0386]	[0.0413]
F_EXPO	0.2255***	0.1438***	0.4857***	0.2444***	0.1093***	0.5078***	0.2424***	0.1712***	0.5106***
	[0.0273]	[0.0324]	[0.0345]	[0.0321]	[0.0383]	[0.0405]	[0.0269]	[0.0319]	[0.0340]
F_TRAI	0.6777***	0.8609***	1.1708***	0.6590***	0.8112***	1.1357***	0.6942***	0.8833***	1.2020***
	[0.0226]	[0.0271]	[0.0309]	[0.0266]	[0.0322]	[0.0364]	[0.0223]	[0.0268]	[0.0306]
F_QUAL	0.2941***	0.3430***	0.5246***	0.3125***	0.3885***	0.4881***	0.3257***	0.3608***	0.5468***
	[0.0271]	[0.0317]	[0.0346]	[0.0319]	[0.0376]	[0.0408]	[0.0267]	[0.0313]	[0.0340]

F_AGE	0.0360*	-0.0878***	-0.0826***	-0.0031	-0.0777***	-0.1217***	0.0438**	-0.0678***	-0.0622**
	[0.0191]	[0.0234]	[0.0256]	[0.0226]	[0.0278]	[0.0302]	[0.0188]	[0.0230]	[0.0252]
F_LOC	0.0283**	-0.0083	0.0398**	0.0335**	-0.0228	0.0630***	0.0234**	-0.0121	0.0357**
	[0.0113]	[0.0136]	[0.0156]	[0.0135]	[0.0163]	[0.0184]	[0.0112]	[0.0134]	[0.0153]
M_FEM	0.1217***	0.0094	-0.1451***	0.1155***	-0.0174	-0.1559***	0.1087***	-0.0087	-0.1573***
	[0.0266]	[0.0330]	[0.0404]	[0.0318]	[0.0397]	[0.0480]	[0.0263]	[0.0326]	[0.0400]
M_EXP	0.0049***	0.0071***	0.0023	0.0056***	0.0079***	0.0034**	0.0042***	0.0066***	0.0013
	[0.0010]	[0.0013]	[0.0014]	[0.0012]	[0.0015]	[0.0017]	[0.0010]	[0.0012]	[0.0014]
Constant	-1.8084***	-2.6085***	-5.3263***	-1.4657***	-2.1916***	-4.8177***	-1.5535***	-2.2186***	-4.8173***
	[0.1247]	[0.1459]	[0.2569]	[0.1333]	[0.1554]	[0.2720]	[0.1221]	[0.1417]	[0.2439]
Observations	55,194	55,194	55,194	37,369	37,369	37,369	56,308	56,308	56,308
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in square brackets. Table 5 shows the estimation results of model: FIN_CRE is the credit access of firms before COVID-19, FIN_LIQ is liquidity movement during COVID-19, FIN_ARR is whether firms expect not to fail arrears; INV_PROD, INV_PROC, INV_RD which are dummies respectively whether firms introduce new/improved products/services, process, spend money on R&D; others are control variables divide into 2 categories: Firm characteristics includes F_SIZE based on the number of employees, F_SEC comprised 2 sectors manufacturing and service, F_OWN is whether the firm is foreign-owned, F_EXPO is whether the firm export, F_TRAIN is whether the firm has training program for employees, F_QUAL is whether the firm has internationally recognized quality certification, F_LOC is the population of where the firm is located, F_AGE equals ln(firm's operation years); Other controls are classified into Manager characteristics following by M_FEM is whether the firm has female managers and M_EXP is the number of sector-related experience years of top manager.

Source: The authors (2024)

Table 6: Regression results: the impact of innovation on firm survival

VARIABLES	(1) SUV_STS	(2) SUV_SLS	(3) SUV_APT	(4) SUV_EWF	(5) SUV_STS	(6) SUV_SLS	(7) SUV_APT	(8) SUV_EWF	(9) SUV_STS	(10) SUV_SLS	(11) SUV_APT	(12) SUV_EWF
INV_PROD	0.2764***	0.0412*	0.0632***	0.1626***								
	[0.0434]	[0.0243]	[0.0029]	[0.0225]								
INV_PROC					0.1294**	0.0177	0.0416***	0.0992***				
					[0.0542]	[0.0298]	[0.0035]	[0.0273]				
INV_RD									0.1721***	0.1025***	0.0386***	0.0936***
									[0.0618]	[0.0330]	[0.0040]	[0.0310]
F_SIZE	0.2985***	0.1743***	0.0314***	-0.0449***	0.2992***	0.1743***	0.0315***	-0.0447***	0.2968***	0.1707***	0.0311***	-0.0459***
	[0.0273]	[0.0157]	[0.0018]	[0.0141]	[0.0273]	[0.0157]	[0.0018]	[0.0141]	[0.0273]	[0.0158]	[0.0018]	[0.0141]
F_SEC	0.1996***	-0.0357	-0.0162***	0.0895***	0.2083***	-0.0340	-0.0143***	0.0950***	0.2127***	-0.0371	-0.0133***	0.0970***
	[0.0367]	[0.0235]	[0.0027]	[0.0208]	[0.0367]	[0.0235]	[0.0027]	[0.0207]	[0.0366]	[0.0235]	[0.0027]	[0.0207]
F_OWN	-0.1454**	0.1076***	0.0058	-0.0399	-0.1429**	0.1078***	0.0064	-0.0384	-0.1458**	0.1076***	0.0064	-0.0385
	[0.0631]	[0.0365]	[0.0043]	[0.0331]	[0.0630]	[0.0365]	[0.0043]	[0.0331]	[0.0630]	[0.0365]	[0.0043]	[0.0331]
F_EXPO	0.0903*	0.1200***	-0.0010	0.0004	0.1015*	0.1216***	0.0008	0.0051	0.0951*	0.1152***	-0.0006	0.0020
	[0.0537]	[0.0282]	[0.0034]	[0.0262]	[0.0537]	[0.0282]	[0.0034]	[0.0262]	[0.0537]	[0.0282]	[0.0034]	[0.0263]
F_TRAI	0.2214***	0.0649***	0.0300***	0.1049***	0.2453***	0.0682***	0.0336***	0.1152***	0.2369***	0.0579**	0.0336***	0.1155***
	[0.0416]	[0.0239]	[0.0028]	[0.0219]	[0.0416]	[0.0239]	[0.0028]	[0.0219]	[0.0419]	[0.0240]	[0.0029]	[0.0220]
F_QUAL	0.3382***	0.1362***	-0.0031	0.0270	0.3505***	0.1377***	-0.0013	0.0319	0.3474***	0.1319***	-0.0017	0.0309
	[0.0559]	[0.0278]	[0.0033]	[0.0259]	[0.0558]	[0.0278]	[0.0033]	[0.0259]	[0.0558]	[0.0278]	[0.0033]	[0.0259]
F_AGE	0.2711***	-0.0060	0.0050**	0.0966***	0.2708***	-0.0058	0.0058**	0.0985***	0.2719***	-0.0049	0.0055**	0.0980***
	[0.0304]	[0.0196]	[0.0022]	[0.0174]	[0.0304]	[0.0196]	[0.0022]	[0.0174]	[0.0304]	[0.0196]	[0.0023]	[0.0174]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
F_LOC	-0.0253	-0.0390***	0.0114***	-0.0234**	-0.0238	-0.0386***	0.0118***	-0.0227**	-0.0248	-0.0394***	0.0116***	-0.0231**
	[0.0177]	[0.0116]	[0.0013]	[0.0100]	[0.0177]	[0.0116]	[0.0013]	[0.0100]	[0.0177]	[0.0116]	[0.0013]	[0.0100]
M_FEM	-0.2605***	-0.0447	0.0061*	-0.0872***	-0.2555***	-0.0438	0.0074**	-0.0836***	-0.2522***	-0.0423	0.0078**	-0.0825***
	[0.0426]	[0.0279]	[0.0032]	[0.0246]	[0.0425]	[0.0278]	[0.0032]	[0.0246]	[0.0425]	[0.0279]	[0.0032]	[0.0246]
M_EXP	0.0021	-0.0009	-0.0004***	0.0045***	0.0024	-0.0009	-0.0004***	0.0046***	0.0025	-0.0009	-0.0003***	0.0046***
	[0.0018]	[0.0011]	[0.0001]	[0.0010]	[0.0018]	[0.0011]	[0.0001]	[0.0010]	[0.0018]	[0.0011]	[0.0001]	[0.0010]
Constant			0.1705***	0.7874***			0.1782***	0.8083***			0.1876***	0.8297***
			[0.0161]	[0.1296]			[0.0162]	[0.1295]			[0.0162]	[0.1295]
Observations	41,433	37,643	56,308	56,308	41,433	37,643	56,308	56,308	41,433	37,643	56,308	56,308
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared			0.1063				0.1010				0.1003	

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in square brackets. Table 6 shows the estimation results of model: SUV_STS is the firm status of operating whether open or temporarily close or permanent close; SUV_SLS is the average change in monthly sales compared to 1 year ago; SUV_APT is index for adapting activities responding to COVID-19; SUV_EWF is whether firms expected to recover the same work force as before COVID-19; INV_PROD, INV_PROC, INV_RD which are dummies respectively whether firms introduce new/improved products/services, process, spend money on R&D; others are control variables divide into 2 categories: Firm characteristics includes F_SIZE based on the number of employees, F_SEC comprised 2 sectors manufacturing and service, F_OWN is whether the firm is foreign-owned, F_EXPO is whether the firm export, F_TRAIN is whether the firm has training program for employees, F_QUAL is whether the firm has internationally recognized quality certification, F_LOC is the population of where the firm is located, F_AGE equals ln(firm's operation years); Other controls are classified into Manager characteristics following by M_FEM is whether the firm has female managers and M_EXP is the number of sector-related experience years of top manager.

Source: The authors (2024)

5. Conclusion

By applying the combination of ordered, bivariate logit and pooled OLS regression, the findings demonstrate a positive correlation between financial resilience and firm survival. Specifically, firms that possess the ability to access official financial resources, such as banks providing external financing, and effectively manage internal financial factors, such as liquidity and arrears, exhibit a greater capacity to overcome challenges stemming from the shocks like COVID-19. Besides, the findings demonstrate the mediating role of innovation in the relationship between financial resilience and firm survival. Thus, by actively engaging in innovation, firms build a stronger foundation for adapting to changing stakeholder needs.

Based on the findings, the paper's results could have broader implications for firms. First, managers should put effort into building a flexible, yet robust financial system (Stephen et al., 2019). Moreover, appropriate management of liquidity is also undeniably essential to ensure enough resources and stability withstanding economic downturns. However, only a sound financial system is not enough to help maintain a presence in the market, so it is better for firms to continuously engage in innovating their operations and explore various means of accessing credit from banks or financial institutions to foster innovation and growth.

For stakeholders like regulators, they can show help during crisis by prioritizing the policies that streamline access to official financial resources for businesses, including simplifying the processes for obtaining external financing from banks. This enables firms to effectively manage liquidity, address arrears, and make critical investments such as innovation. Moreover, regulators should encourage innovation-specific policies, like R&D tax incentives or funding programs, to empower businesses to adapt and survive by fostering an innovation-friendly environment.

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