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SMEs' innovation and government support during the COVID-19 pandemic

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Received 22 August 2023
Revised 8 October 2023
9 December 2023
17 January 2024
Accepted 25 January 2024

Abstract

Purpose – There is a need for research examining how governments and firms responded to the coronavirus disease (COVID-19) pandemic. This study investigates the interdependence between governments and innovative small and medium-sized enterprises (SMEs) during the pandemic in relation to the dynamic capabilities and resource dependence theories.

Design/methodology/approach – We use World Bank survey data collected immediately before and after the COVID-19 outbreak and a generalized structural equation model to examine the mediating role of government support in the relationship between firm innovation, resilience and survival.

Findings – Innovative SMEs exhibited higher resilience and a better chance of survival during the pandemic, partly due to attracting more government support.

Originality/value – This study offers a novel understanding of the government's role in supporting innovative SMEs during the pandemic. The findings have implications for how government support policies can limit the deadweight effect and the substitution effect.

Keywords Government support, Innovation, Firm survival, COVID-19, SMEs

Paper type Research paper

1. Introduction

Many firms were forced to close during the coronavirus disease (COVID-19) pandemic. Demmou *et al.* (2021) estimated that approximately 38% of firms would have faced a liquidity crunch after ten months without government intervention. As small and medium-sized enterprises (SMEs) tend to rely on internal funds, their liquidity is more severely affected by large declines in sales (OECD, 2020; Dörr *et al.*, 2022). This makes research into how SMEs can survive crises more relevant.

As enterprises are vital to long-term productivity, prosperity and social welfare, governments adopted wide-ranging measures to help them combat the devastating impact of the pandemic, including generous financial packages to prevent firms from collapsing

JEL Classification — D24, G33, H12, O38

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We would like to thank discussants at VIID 2022 Conference, and seminar participants at Foreign Trade University of Vietnam for their valuable comments and suggestions. This research is funded by Foreign Trade University under research program number FTURP01-2020-04.

Conflicts of interest: There are no conflicts of interest associated with this research.

Journal of Asian Business and Economic Studies
Emerald Publishing Limited
2515-964X
DOI 10.1108/JABES-08-2023-0300

(Didier *et al.*, 2021; Dörr *et al.*, 2022). However, due to limited resources, asymmetric information and urgency, allocating government subsidies is a difficult task and governments needed to narrow down the targeted firms (Didier *et al.*, 2021). Governments face two dilemmas in delivering aid: The deadweight effect and the substitution effect (Groenewegen *et al.*, 2021; Baghana and Mohnen, 2009; Santarelli and Vivarelli, 2002). The deadweight effect occurs when government support is wasted on firms that do not need it. The substitution effect refers to the consequences of government subsidies when they allow inefficient "zombie" firms to survive with cheap money, hampering competition and creative destruction. The COVID-19 pandemic provided an opportunity to study this important dilemma, which should prove valuable to policymakers when coping with future crises.

We use a cross-country dataset provided by the World Bank to investigate the role of firm innovation and government support in SMEs' survival and resilience during the pandemic. We define an SME as a firm with fewer than 250 employees and annual sales of less than EUR 50 million (USD 57.8m) [1]. Consistent with dynamic capabilities theory, we find that SMEs that were innovative immediately before the pandemic were more likely to show resilience and successfully navigate the pandemic. Specifically, innovative SMEs were more likely to change their business models by introducing new products and services, increasing online business activities and switching to carry-out models. These results corroborate those of Cefis and Marsili (2019) and Chit *et al.* (2022), who showed that innovative capabilities improved firm survivability during the 2008 crisis and the COVID-19 pandemic.

Moreover, we show how governments helped SMEs overcome crises. Predictably, we find that governments prioritized supporting firms that sustained more damage due to the pandemic and that this support aided their survival. Nevertheless, we show that governments offer more than needs-based support. Using a structural equation model, in which government support mediates the relationship between innovation and SMEs' survival, we provide evidence that innovative firms are more likely to receive government support. This provides innovative firms with more confidence to innovate, implement resilience measures and survive.

The results provide novel contributions to the academic literature, along with offering important policy implications. They compound arguments in prior studies that government support programs can be effective and efficient by targeting innovative firms (Dörr *et al.*, 2022) or firms that are severely affected but viable in the long run (Groenewegen *et al.*, 2021; Cirera *et al.*, 2021). While governments focused on those SMEs most severely hit by the pandemic, they should take care not to allow generous support to distort economic incentives and hamper the Schumpeterian process (Dörr *et al.*, 2022) or to destroy the innovativeness and competitiveness of the post-crisis economy. Our findings align with previous studies showing that governments play an increasing role in stimulating SMEs' innovation (North *et al.*, 2001; Doh and Kim, 2014), as innovative SMEs face more constraints in financial access and have limited internal funds (Pederzoli *et al.*, 2013; North *et al.*, 2001).

2. Literature review and hypothesis development

2.1 Government support and firm survival

According to resource dependence theory, firms maintain many links within their ecosystem that provide access to much-needed resources and support (Sheppard, 1995; Pfeffer and Salancik, 2003). Among these, the link to the government is important, particularly during crises (Hillman *et al.*, 2009; Pfeffer and Salancik, 2003), as the government can set and enforce

regulations, control key resources, provide direct cash subsidies, place restrictions on the entry of rivals, regulate substitutes and complements, fix prices, control competition and offer tax waivers and relief (Pfeffer and Salancik, 2003).

The relationship is not one-way, but rather interdependent and reciprocal. Firms are instrumental in the achievement of government goals (Thukral, 2021). In times of crisis, providing firms with financial support enables the government to save the entire economy. As an emergency measure to contain corporate insolvency during the pandemic, many governments provided firms, especially SMEs, with direct cash subsidies and other supports (Dörr *et al.*, 2022; Devereux *et al.*, 2020; Demmou *et al.*, 2021).

Lockdowns, quarantines and restrictions threaten the survival of firms (Wenzel *et al.*, 2020). Many firms experienced a large decline in production and sales (Dörr *et al.*, 2022; Demmou *et al.*, 2021; Devereux *et al.*, 2020). Demmou *et al.* (2021) estimated that without government intervention, approximately 38% of firms would have faced a liquidity crunch ten months after the implementation of quarantine regulations. SMEs were affected more than large firms (OECD, 2020). Without government support, many would have gone bankrupt (Dörr *et al.*, 2022). Shafi *et al.* (2020) examined Pakistani SMEs during the pandemic and found that 67.93% could not survive without government support.

To examine the effectiveness of government support on SME survival during the COVID-19 pandemic, we propose the following hypothesis.

H1. SMEs that received government support during the COVID-19 pandemic were more likely to survive.

2.2 The deadweight effect, the substitution effect and supporting innovative firms

In delivering support to firms during the pandemic, governments face the dilemma of the deadweight effect and the substitution effect (Groenewegen *et al.*, 2021; Baghana and Mohnen, 2009; Santarelli and Vivarelli, 2002). The deadweight effect implies that government subsidies reached firms that would have survived the pandemic even without aid. The substitution effect refers to the situation in which government aid keeps inefficient firms alive. Devereux *et al.* (2020) argued that government subsidies limit firms' incentives to adapt to new business conditions, potentially hindering the Schumpeterian creative destruction process. Inefficient firms that would have gone bankrupt regardless of the pandemic may have survived due to government subsidies (Groenewegen *et al.*, 2021; Dörr *et al.*, 2022). Dörr *et al.* (2022) showed that the German government's largely indiscriminate granting of liquidity subsidies during the pandemic prolonged the survival of inviable small firms.

Government resources dedicated to this support are limited. Cirera *et al.* (2021) reported that only one in four firms received any type of public support, and this number was lower in lower-income countries. The support schemes required a huge number of fiscal costs (Devereux *et al.*, 2020; Cirera *et al.*, 2021). Governments must be wise in the use of this costly support, keeping the substitution and deadweight effects in check.

Devereux *et al.* (2020) emphasized that government support should intentionally shape business incentives and stimulate economic activities during the recovery phase. Groenewegen *et al.* (2021) showed that the Dutch government's aid achieved both effectiveness and efficiency when targeting both firms hit hard by the pandemic and better-managed firms that were more viable in the long run. Cirera *et al.* (2021) reported that large or formal firms are more likely to access public support. Dörr *et al.* (2022) suggested that support programs target innovative firms.

While external support was necessary during the pandemic, SMEs had to address the challenges themselves (Thorgren and Williams, 2020; Adam and Alarifi, 2021). Resilience within crisis management enabled firms to respond to the pandemic (Kuckertz *et al.*, 2020;

Thukral, 2021; Li *et al.*, 2021). Resilience is not only the capacity to cope with short-term turbulence, but also the innovative ability to adapt to dynamic business conditions in the long term (Li *et al.*, 2021). Resilient firms view innovation practices as part of their organizational culture and as a means to achieve a competitive advantage (de Oliveira Teixeira and Werther, 2013). In times of turbulence, when previously acquired competencies become obsolete, innovation reforms substantive capabilities and leads to the development of new or improved products or services (Nunes and Lopes, 2015). To survive the pandemic and develop the business in the long run, SMEs must adjust and innovate (Ratten, 2020; Thukral, 2021). Adam and Alarifi (2021) and Chit *et al.* (2022) found that innovative SMEs were more likely to survive the COVID-19 pandemic.

However, financial constraints may prevent innovative firms from achieving resilience. Innovative SMEs encounter more difficulty in accessing funds (Pederzoli *et al.*, 2013; North *et al.*, 2001; Nguyen *et al.*, 2022a). The risk and high asymmetric information of innovation (Bond *et al.*, 2005; Martí and Quas, 2018) inhibit innovative firms from accessing banks and financial markets. Thus, public support plays an increasingly important role in SME innovation (North *et al.*, 2001; Doh and Kim, 2014). Government support alleviates difficulties in financing research and development (R&D) investments (Hewitt-Dundas and Roper, 2017). This can be achieved through direct channels, such as grants for R&D and innovation activities, or indirect channels, such as tax waivers and relief (Patrucco *et al.*, 2022). These assist firms in creating innovative capabilities to develop, produce and commercialize much-needed, highly value-added products and services. The ultimate goal is to improve productivity, economic growth and welfare (Afcha and García-Quevedo, 2016).

This was especially important during the COVID-19 pandemic, when governments relied on firms for innovative solutions to urgent issues. Several governments have attempted to develop innovative products and services (Patrucco *et al.*, 2022). Azoulay and Jones (2020) suggested that government support for private-sector innovation was crucial for overcoming the pandemic. Dörr *et al.* (2022) recommended that government support be allocated to SMEs that responded innovatively to the pandemic.

We propose the following hypotheses.

H2. Innovative SMEs were more likely to receive government support during the COVID-19 pandemic.

H3. Government support mediated the positive effects of innovation on firms' resilience and survival during the COVID-19 pandemic.

3. Data and variable construction

3.1 Data

We use data from the Enterprise Surveys 2019 and COVID-19 Surveys from 2020 on the World Bank data portal [2], which were conducted by the World Bank Group, the European Bank for Reconstruction and Development, the European Investment Bank and the Development Economics Vice Presidency. In addition to several core questions covering a wide range of business environments in the standard Enterprise Surveys, follow-up surveys provided a snapshot of the impact of the pandemic on the private sector.

In total, we have had a cross-sectional dataset of 17,707 manufacturing, retail and other service firms. As we are interested in SMEs, we retain firms with fewer than 250 employees and annual sales of no more than EUR 50 million (USD 57.8m). We lose several observations because of missing data. Finally, we have 6,869 observations of SMEs in 21 countries and territories. Table A1 [3] in the Online Appendix lists the number of firms surveyed in each country. The surveyed firms are from emerging countries in Europe, Asia and Africa.

However, there are two developed markets, including Italy and Portugal. Survey experts decided the sample selection in each country to represent the economy. The complete dataset and details of the survey questions, methodology and implementation are publicly available on the World Bank data portal.

3.2 Models and variable construction

As survival is a binary variable, we estimate the following probit model to test hypothesis H1, where β_1 is expected to be positive.

$$Survival/Resilience_i = \beta_0 + \beta_1 Government\ Support_i + \beta_2 Innovation_i + \sum \gamma_j Control_{ij} + \varepsilon_i \quad (1)$$

where i denotes firm i and j denotes control variable j.

As we are interested in the mediating role of government support in this relationship, as illustrated in Figure A1 [3] in the Online Appendix, we estimate a generalized structural equation model of two probit models, including Equations (1) and (2).

$$Goverment\ Support_i = \alpha_0 + \alpha_1 Innovation_i + \sum \alpha_j Control_{ij} + \mu_i \quad (2)$$

Bagozzi (1977) introduced a structural equation model into marketing research. This method has been extensively used in marketing (Bagozzi and Yi, 1988; Henseler, 2012), management (Shook *et al.*, 2004) and medicine (Bentler and Stein, 1992; Kupek, 2006). Equation (2) is the mediation equation, where α_1 shows the effect of innovation on government support. Substituting government support in (1) by the right-hand side of (2), we can see that β_2 represents the direct effect of innovation on firm survival, whereas $\beta_1 \times \alpha_1$ shows the indirect effect of innovation on firm survival through the channel of government support. Hypothesis H2 implies that α_1 is expected to be positive, whereas H3 means that $\beta_1 \times \alpha_1$ has a positive value.

3.3 Variable construction

3.3.1 Enterprise survival and resilience. We use four proxies to measure firm survival and resilience. First, *OPEN* is a dummy variable that takes the value of one if the firm was still in business in the third round of the Follow-up COVID-19 Survey and zero otherwise. Although all three rounds of the COVID-19 surveys contained this information, there were inconsistencies. For example, 22 firms stated that they closed permanently in the first round but opened again in the second round. Therefore, we use only the status in the last round to measure firm survival. Moreover, by the time the third-round survey was conducted, most countries had contained the pandemic and firms that were still open in this round could be considered to have survived the pandemic.

Resilience is an important aspect of crisis management, representing the creative ability to adjust business operations and survive crises (Kuckertz *et al.*, 2020; Thukral, 2021). We used three dummy variables, *NEWPROD*, *ONLINE* and *CARRYOUT*, to measure firm resilience. *NEWPROD* takes the value of one if the firm answered in at least one round that it introduced new or improved products or services in response to the COVID-19 outbreak and zero otherwise. *ONLINE* takes the value of one if the firm answered in at least one round that it started or increased online business activities in response to the COVID-19 outbreak and zero otherwise. *CARRYOUT* takes the value of one if the firm answered in at least one round that it started or increased delivery or carried out goods or services in response to the COVID-19 outbreak and zero otherwise.

3.3.2 Innovation capability. *INNO* measures innovation capability. *INNO* is one if, according to the Enterprise Survey 2019, during the previous three years, the firm had "introduced new or improved products or services" or "introduced any new or improved process," and zero otherwise. A new or improved process is defined as "methods of manufacturing products or offering services; logistics, delivery, or distribution methods for inputs, products, or services; or supporting activities for processes."

It is worth noting that *INNO* measures firms' innovation capabilities prior to the pandemic, whereas *NEWPROD*, *ONLINE* and *CARRYOUT* measure their resilience during the pandemic in response to the COVID-19 outbreak. As the COVID-19 pandemic was unexpected exogenous shock, reverse causality was unlikely.

3.3.3 Government support. Follow-up COVID-19 Surveys also asked, "In the last 12 months, has this establishment received any national or local government support in response to the crisis?" We construct *GOVSPRT* as a dummy variable, which equals one if the response to this question is "Yes" in one of the three rounds of COVID-19 surveys and zero otherwise.

3.3.4 Control variables. We use the variable *NEEDAID* to test whether government support reached firms that needed aid and to observe the effect of deadweight loss. Groenewegen *et al.* (2021) used firms' low revenue expectations and high revenue uncertainty for the next 12 months as measures of the need for aid. In each of the three rounds of COVID-19 surveys, two questions were asked: "Comparing this establishment's sales for [insert last completed month] with the same month in 2019, did sales increase, remain the same, or decrease?"; and "Since the outbreak of COVID-19, has/have this establishment's liquidity or cash flow increased, remained the same, or decreased?" The answer received values of 1, 2, or 3 if the firm reported that sales or cash flows increased, remained the same, or decreased, respectively. We defined *NEEDAID* as the average value of the answers to all six questions in the three rounds. A higher value of *NEEDAID* indicates a more severe impact of the pandemic on the firm's cash flows and, thus, a higher need for aid. If *NEEDAID* is positively associated with government support, deadweight loss will be limited (Groenewegen *et al.*, 2021).

We use firm size, the natural logarithm of sales in USD [4] (*LNSALE*), the natural logarithm of firm age (*LNAGE*) and *EXPORT* – a dummy variable that takes the value of one if the firm had export activities, as control variables. Firm size, age and export activities can improve a firm's likelihood of survival (Esteve-Pérez and Mañez-Castillejo, 2008). Firms that gain sales from export activities are less likely to default because participation in international markets requires competitiveness and efficiency, which results in better survival prospects (Esteve-Pérez and Mañez-Castillejo, 2008). This could have been different in the COVID-19 pandemic, as transport disruptions and social distancing had an adverse impact on exporting firms.

Political connections can improve firm survival (Du and Girma, 2010). It is easier for firms with close relationships with government agencies or officials to obtain state-controlled resources or access to financing (Haveman *et al.*, 2017; Peng *et al.*, 2016). In addition to state ownership and the political connections of managers (Marquis and Qian, 2014), government contracts can be considered a proxy for political connections (Ngo and Susnjara, 2020; Nguyen *et al.*, 2022c). *POLI* is a dummy variable that equals one if the firm is partially or wholly owned by the government, if any top managers and board members have ever been elected or appointed to a political position, or if the firm secured or attempted a government contract and zero otherwise.

Networks with business partners are an essential resource for firms' survival and growth, as they enhance their adaptability to environmental changes and improve their ability to access external resources (Chen and Wu, 2011; Wu and Chen, 2012). We define *ASSO* as a dummy variable that equals one if the firm belongs to a business membership organization,

trade association, guild, chamber of commerce, or other business support groups and zero otherwise.

Finally, industry and country dummies are included in the model to control for industry- and country-specific effects.

4. Results

Table A2 [3] in the Online Appendix reports the summary statistics. As much as 95.2% of the firms were open when the third round of the Follow-up Survey on COVID-19 was conducted. This is higher than the corresponding numbers in Chit *et al.* (2022) and Nguyen *et al.* (2022b) because we use only the open status of reporting firms in the third-round survey to measure firm survival. Unreported tests that treated non-responding firms as "closed" yielded results qualitatively similar to those presented in this paper.

In all three survey rounds, 23.1% of the firms introduced new or improved products or services, 20.7% started or increased online business activities and 27.5% started or increased the delivery or carry-out of goods or services. Immediately before the pandemic, 33.4% of respondents reported innovation outcomes. Government support in response to the pandemic reached 43.3% of SMEs. The mean *NEEDAID* was 2.355, indicating that most firms experienced a decline in sales or cash flow during the pandemic. Untabulated results indicate that 5,503 firms (80.1%) reported decreases in sales and cash flows at least once in six questions from the three survey rounds.

Table 1 reports the regression results of Equation (1). The coefficients of *GOVSPRT* are positive and strongly significant in all columns, thus supporting hypothesis H1. Government support kept SMEs afloat and encouraged their resilience during the pandemic. This finding

Variables	(1) OPEN	(2) NEWPROD	(3) ONLINE	(4) CARRYOUT
GOVSPRT	0.351***	0.351***	0.394***	0.430***
	(5.29)	(7.17)	(7.59)	(8.05)
INNO	0.0643	0.203***	0.206***	0.151***
	(0.99)	(3.60)	(3.64)	(2.98)
NEEDAID	−0.943***	−0.261***	−0.0642	−0.209***
	(−8.62)	(−4.19)	(−1.44)	(−3.97)
LNSALE	0.0903***	0.0341**	0.0256	0.00701
	(4.18)	(1.96)	(1.64)	(0.51)
LNAGE	0.186***	−0.0942**	0.0454	−0.0141
	(2.76)	(−2.14)	(0.98)	(−0.30)
EXPORT	0.000611	−0.0139	0.0853**	−0.0915
	(0.01)	(−0.48)	(2.13)	(−1.37)
POLI	0.204**	0.0855*	0.0991*	0.107**
	(2.18)	(1.74)	(1.88)	(2.32)
ASSO	−0.0605	0.0244	−0.00694	0.0131
	(−0.59)	(0.55)	(−0.15)	(0.26)
Constant	1.922***	−0.852***	−1.529***	−0.445**
	(3.83)	(−3.60)	(−5.58)	(−2.02)
Observations	6,869	6,869	6,864	6,869
Industry FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Clustered SE	Country	Country	Country	Country

Note(s): *z*-statistics in parentheses. ***$p < 0.01$, **$p < 0.05$ and *$p < 0.1$
Source(s): Authors' own work

Table 1. The effect of government support on SMEs' survival and resilience

is in line with arguments about the role of government support during the pandemic (Dörr *et al.*, 2022). The marginal effects estimated from the regression in Column (1) show that government support increased the probability of firm survival, meaning that it reduced the probability of firm closure by 2.8%. Given that the average probability of firm closure was 4.8%, government support on average could reduce the risk of firm closure by as much as 58% (2.8 divided by 4.8), suggesting that government support during the COVID-19 pandemic was economically effective. The marginal effects of *GOVSPRT* on *NEWPROD*, *ONLINE* and *CARRYOUT* were 9.8%, 10.1% and 13%, respectively. These are respectively 42.4%, 48.8% and 47.3% of the means of *NEWPROD, ONLINE* and *CARRYOUT*, indicating that government support boosted firm resilience during the COVID-19 pandemic.

The coefficients of *INNO* are strongly significant and positive in Columns (2), (3) and (4), suggesting that innovative SMEs were more likely to be resilient and have the capacity to adapt to change. This finding is consistent with the argument that high innovation performance indicates a high level of dynamic capability (Eisenhardt and Martin, 2000; Duran *et al.*, 2016).

The coefficients of *NEEDAID* are significant and negative in Columns (1), (2) and (4), indicating that the adverse impact of the pandemic on sales and cash flows severely obstructed SMEs' resilience and significantly reduced the likelihood of their survival.

The coefficients of *LNSALE* are positive and significant in Columns (1) and (2), suggesting that larger firms were better able to develop new products or services and survive. The coefficient of *LNAGE* is positive and significant in Column (1), but negative and significant in Column (2), indicating that older SMEs had a better chance of surviving the pandemic but were not more resilient. The coefficient of *EXPORT* is significant and positive in Column (3), implying that exporting firms may be more resilient. The positive and significant coefficients of *POLI* in all the models suggest that political connections enhanced a firm's capability to adjust its business models and survive. This finding is in line with that of Chit *et al.* (2022), who reported that political connectedness had a positive impact on the survival of European SMEs during the pandemic.

Table A3 [3] in the Online Appendix presents the estimation results of the structural equation model where government support serves as a mediator in the relationship between innovation and SMEs' survival. Column (1) reports determinants of government support. The coefficient of *NEEDAID* is significant and positive, suggesting that government support reached the firms that required aid. This is consistent with the findings of Groenewegen *et al.* (2021) that the deadweight effect of government support was limited. The positive and significant coefficient of *INNO* supports hypothesis H2. Governments tended to support innovative firms when resolving the dilemma between public health and saving the economy (Patrucco *et al.*, 2022; Azoulay and Jones, 2020). The coefficient of *LNSALE* is significant and positive, which is in line with previous evidence in past literature that government support went to viable firms to stimulate the economy after a crisis (Groenewegen *et al.*, 2021; Cirera *et al.*, 2021). The coefficients of *POLI* and *EXPORT* are also significant and positive, suggesting that firms with political connections and exports were more likely to be assisted by the government.

Column (2) reports the direct effects of the independent variables on firm survival, while Column (3) shows their indirect effects through the channel of government support. Column (4) reports the total effects. The indirect effect of *INNO* is significant and positive. This finding supports hypothesis H3 regarding the mediating role of government support in the relationship between innovation and survival.

The indirect effect of *NEEDAID* is significant and positive, whereas its direct effect is significant and negative. Thus, government support was effective in alleviating the challenges faced by SMEs during the pandemic. However, this support did not completely eliminate the impact of the pandemic as the total effect of *NEEDAID* remained negative and

strongly significant. This may have been due to the number of inefficient firms exiting the market (Santarelli and Vivarelli, 2002).

Table A4 [3] in the Online Appendix reports the direct and indirect effects of the key factors on firm resilience during the pandemic. The direct effects of innovation (*INNO*) on the three resilience measures are positive and significant. This demonstrates the role of innovation in SMEs' innovative capacity of SMEs. The indirect effects of *INNO* are all positive and significant. The direct effects of *NEEDAID* are negative and significant, except for *ONLINE*, suggesting that worsening sales, liquidity and cash flows hampered SMEs' resilience during the pandemic. The indirect effects of *NEEDAID* are significant and positive for all measures of resilience, indicating that government support was effective and efficient in alleviating the pandemic's negative impacts and helping firms adapt to new circumstances.

4.1 Endogeneity issue

As previously mentioned, *INNO* was measured in 2019, and the COVID-19 pandemic was exogenous shock; thus, reverse causality was unlikely. Nevertheless, government support is measured in the same period as firm resilience (*NEWPROD*, *CARRYOUT*, *ONLINE*) and thus could be a reverse causality. In other words, the government may have provided support to firms that showed more resilience during the pandemic.

We address this concern by adding a robustness test to a subsample, *excluding* firms that first reported receiving government support in survey rounds 2 or 3 and firms that first reported implementing resilience measures in survey round 1. In other words, this subsample includes (1) firms that reported receiving government support only in the first round, (2) firms that reported implementing resilience measures in the second and third rounds and, as a control group, (3) firms that did not receive government support and/or did not implement resilience measures. As firms in this subsample received government support only before implementing the resilience measures, reverse causality was unlikely.

We repeat our structural equation model using this subsample and report the results in Table A5 [3] of the Online Appendix. Consistent with the previous findings, in Panel A, the coefficient of *INNO* is significant and positive, indicating that government support tended to approach innovative firms. In Panel B, the indirect effects of *INNO* on firm survival and resilience are significant and positive, confirming the mediating role of government support in the relationships between innovation capability, firm survival and resilience.

5. Discussion and conclusions

This study is among the first to show the importance of government support to the resilience and survival of innovative SMEs during the COVID-19 pandemic. Although urgent government support helped firms relieve short-term pressure, innovative organizational culture and capabilities are decisive for firms in building resilience during crises (Kabir and Abubakar, 2022; Waehning *et al.*, 2023). Consistent with Zahra *et al.* (2006), dynamic capabilities transform the substantive capabilities accumulated through innovation processes to help firms adapt quickly to changing customer behaviors and gain favor from the government. Government support enables innovative firms to exert their internal strength to overcome challenges and helps them achieve their macroeconomic goals.

Our findings also indicate that in times of crisis, a support program should target not only the firms that are most affected, but also viable firms that can quickly provide innovative solutions and adapt to the changing environment. The simplistic view that government support should only target firms that are most in need is plagued by the substitution effect. In other words, it may help firms survive short-term challenges, but will have repercussions afterward, as it distorts economic incentives and keeps inefficient firms alive, hampering

market competition and creative destruction. A dual-goal policy of government support can be effective in alleviating short-term distress, but it can also boost recovery and be more sustainable with a view to the long-term efficiency.

Notes

1. https://single-market-economy.ec.europa.eu/smes/sme-definition_en
2. http://www.enterprisesurveys.org
3. Please see it on the Online Appendix
4. We collected exchange rates to convert sales from local currency to USD from https://www.xe.com

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Online appendix
The supplementary material for this article can be found online.

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