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The show must go on: The role of public financial support in promoting firm innovation investments during a crisis

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ABSTRACT

During crises, public financial support primarily aims to stabilize firms' cash flows to sustain their operations. However, beyond this intended objective, such support may produce additional outcomes that remain underexplored. This study examines whether the public loan guarantee schemes introduced in the UK during the economic downturn due to the Covid-19 pandemic helped firms address new investment opportunities. Based on opportunity identification theory and using privileged data from UK public institutions covering the 2020–2023 period, we hypothesize and document that firms receiving public financial support are more likely to identify and pursue new innovation-related investment opportunities.

1. Introduction

Mobilization of resources is critical to address innovation opportunities (Guerrero and Siegel, 2024). Yet, during crises, mobilizing resources becomes challenging. Banks tend to tighten lending standards and restrict access to credit, thereby exacerbating firm difficulties in securing funding from their primary source of financing (Groh et al., 2025; Kahle and Stulz, 2013). As such, during crises, firms suffer from reduced ability to address innovation opportunities, thereby limiting their output (Audretsch et al., 2025; Hardy and Sever, 2021).

Public financial support serves as a crucial instrument to provide firms with resources deemed necessary to survive during crises (Belitski et al., 2022; Wang, 2025). Although the primary objective during crises is to sustain firm liquidity to avoid their failure (Casey and O'Toole, 2014), public financial support can produce additional, unseen outcomes that remain underexplored. One particularly neglected aspect is whether public financial support helps firms address new investment opportunities arising from the crisis, particularly in innovation. Addressing these opportunities is a fundamental dimension of entrepreneurial orientation (Covin and Wales, 2012). From the Knight (1921) and Schumpeter's (1939) viewpoint, periods of economic uncertainty open new opportunities for firms to innovate, which are not detected and capitalized equally by incumbent firms (Link and Siegel, 2007; Rabi and Chowdhury, 2025). On the capacity to identify and pursue such investment opportunities often depends the firm future success.

In this paper, we investigate whether public financial support promotes firm investment during a crisis, with a particular focus on innovation-related investment opportunities. Based on the opportunity identification theory (e.g., Ardichvili et al., 2003), we hypothesize that public financial support helps firms identify and pursue new innovation-related investment opportunities. During crises,

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the pressure to prioritize ordinary activities to guarantee survival often leads firms to pursue a conservative strategy, thereby reducing their "entrepreneurial alertness" (Kirzner, 1973) toward riskier investment opportunities. Public financial support is critical to alleviate such pressure, providing financial slack that firms can use to stabilize their operations and redirect resources to address innovation opportunities.

We test our hypotheses by examining Loan Guarantee Schemes (LGSs) introduced in the UK during the Covid-19 pandemic. This context is relevant to our study for three reasons. First, the Covid-19 pandemic represents one of the major crises for firms over the last decades. Disrupting the business environment, this crisis opened rooms for several transformations, often leading firms to seek new investment opportunities to reshape their activity (e.g., Auerbach et al., 2021; Kacer et al., 2025). Second, this period was characterised by large-scale public intervention in credit markets to shore up the banking system and ensure that affected firms had sufficient cash flow and liquidity to sustain themselves (e.g., Belitski et al., 2022). In this context, LGSs—which provide public guarantees on bank-issued debt—became the most widely used public policy instrument in the business arena. The average firm only had a few months of trading cash in the bank and would simply fail in the absence of public support. Third, during the pandemic, LGSs supported many UK firms (Cowling et al., 2023; Kazembalaghi et al., 2025). While the primary objective of these schemes was to stabilise firms' liquidity by reducing banks' downside risk and relaxing credit constraints during the crisis, LGSs also operated as a countercyclical credit policy. By easing financial pressure, they created the conditions under which some firms could move beyond mere survival and identify and pursue innovation-related investment opportunities.

We base our research on the Finance and Investment Decision Survey, a UK firm-level survey to which we have privileged access thanks to a contractual agreement with the UK Department for Business and Trade and the Bank of England. The Survey covers new investments over the period 2020–2023. The results, based on a two-step selection model, confirm our hypotheses that the UK LGSs during Covid-19 help firms, including smaller ones, identify and pursue new innovation-related investment opportunities. In line with Knight (1921) and Schumpeter (1939), our findings show that LGS users have a different investment rate and profile compared to LGS non-users. This evidence suggests that the rate of growth will be different among firms, with firms that received public support during the crisis having potentially better long-term prospects (Cattaneo et al., 2015).

Our study makes three contributions. First, we contribute to the literature on firm innovation (e.g., Audretsch and Belitski, 2020; Guerrero and Link, 2022; Guerrero and Siegel, 2024; Lehmann et al., 2025) by investigating how firms mobilize public financial resources during periods of economic uncertainty to identify and pursue innovation investment opportunities. Our results show that a considerable number of firms employ these resources to seize new investment opportunities, thereby not limiting to purely liquidity support purposes. This indicates that public financial resources are critical for gaining a competitive advantage and innovation potential. Second, we contribute to the literature on the role of public financial support in shaping firm performance (e.g., Bertoni et al., 2023; Colombo et al., 2016; Gicheva and Link, 2016; Guerrero and Urbano, 2019; Link and van Hasselt, 2019; Link et al., 2021; Siegel and Wessner, 2012; Siegel et al., 2003) and the response of the public sector to crises (e.g., Fernández-Gallardo and Payá, 2025; Link, 2024). By documenting that public LGSs promote identification of innovation investments, we redirect attention from the primary objective of liquidity support to positive unforeseen consequences on firm investments. Third, we contribute to research on small business innovation (e.g., Audretsch and Link, 2012; Baumann and Kritikos, 2016; Farè, 2022; Link and Scott, 2012) by showing that, during crises, many of these firms rely on public financial resources to seize innovation investment opportunities.

2. Theoretical background and hypotheses

2.1. Identification of investment opportunities

The ability to identify the opportunities is one of the most crucial traits of a successful entrepreneur (McMullen et al., 2024; Siegel et al., 2003). Opportunity identification theory (e.g., Ardichvili et al., 2003; Siegel and Renko, 2012) focuses on how individuals and organizations identify and exploit opportunities to create value. Rooted in the Austrian School (e.g., McCaffrey et al., 2024), this theory builds on the concept of "entrepreneurial alertness", which refers to an individual's ability to identify market opportunities that others may overlook (Kirzner, 1973). While traditional models treat opportunities as objective phenomena waiting to be discovered, recent approaches emphasize their subjective nature, contending that opportunities are shaped by the entrepreneur's perceptions, creativity, and contextual understanding (e.g., Ramoglou and McMullen, 2024). This perspective highlights the interplay between individual cognition and market conditions, examining the nexus between opportunity identification, resource mobilization, and organizational outcomes (Audretsch and Lehmann, 2025; Klein, 2008).

Opportunity identification plays a crucial role during periods of uncertainty such as economic crises (Townsend et al., 2018). Since the seminal work of Knight (1921), the distinction between risk and uncertainty has become central to our understanding of entrepreneurial action (Dorobat et al., 2025). Knight differentiates between measurable risk, where probabilities can be assigned to outcomes, and uncertainty, where such probabilities cannot be known. An entrepreneur running a firm does not merely take calculated risks, but rather operates in an environment of uncertainty, where outcomes are unpredictable and not easily quantifiable. From Knight's perspective, the entrepreneur is someone who is willing to take risks and able to make decisions in the face of uncertainty (Meinen and Roehe, 2017).

2.2. Identification of investment opportunities during a crisis

Uncertainty is particularly acute during crises (Chatterjee, 2024; Groh et al., 2025). The risk of firm failure increases with the severity and duration of a crisis, primarily due to insufficient precautionary savings (Bartik et al., 2020). This risk is further heightened

for firms operating in highly competitive markets, where any adverse shock that raises their cost base represents a significant challenge (Farè, 2022). Firms with low market power are indeed particularly vulnerable, as they cannot fully transfer these increased costs to consumers. This particularly applies to smaller firms, which often face a liability of smallness and a lack of resources that would shield them from outside shocks (Aldrich and Auster, 1986; Guerrero et al., 2019; Ritter et al., 2013). These firms suffer a greater risk of failure due to their lack of established business models, their dependence on cooperation with external partners, and their lower levels of legitimacy (Cowling and Sclip, 2023).

The collapse of global supply chains during the pandemic left many firms without essential inputs, significantly limiting their ability to maintain production (Audretsch et al., 2025). However, despite the generally negative effect on the broader economy, not all firms are impacted equally during a crisis (Archanskaia et al., 2023; Raby and Chowdhury, 2025). While some firms are negatively impacted, others remain unaffected or even benefit from it. From the Knight's perspective, the outcome largely depends on the firm's ability to identify and pursue opportunities arising from the crisis, which strongly relies on the level of crisis preparedness. There is indeed a strong connection between pre-crisis planning and the strategic response choice set available to the firm during an unanticipated crisis (Savio et al., 2024).

2.3. Public financial support and firm identification of investment opportunities during a crisis

Institutions influence how firms make decisions on the mobilization of resources (Chowdhury et al., 2019; North, 1990). Particularly, public financial support is critical to mitigate uncertainty during crises, often providing firms with financial slack. Financial slack, which refers to financial "resources in excess of the minimum necessary to sustain routine operations" (Vanacker et al., 2017: 1306), plays a crucial role in stabilizing firms and improving their performance. In resource-constrained environments with limited access to external financing, financial slack becomes especially valuable (Bradley et al., 2011).

This risk-averse behaviour reduces a firm's proclivity to identify investment opportunities. During economic downturns, financial slack provides the firm with a buffer against the failures of risky projects, thereby reducing the firm executives' tendency to adopt a risk-averse behaviour when confronted with the possibility of significant losses (Paeleman and Vanacker, 2015). By reducing managerial excessive focus on short-term performance, financial slack can alleviate the potential risk of underinvestment, allowing firms to focus attention on identifying new investment opportunities. Based on these arguments, we hypothesize that public financial support during a crisis helps firms identify new investment opportunities. We formulate the following hypothesis:

Hypothesis 1. *During a crisis, public financial support helps firms identify new investment opportunities.*

2.4. Public financial support and firm identification of innovation-related investment opportunities during a crisis

Schumpeter (1939) theorizes the concept of an innovative entrepreneur as one who approaches periods of economic uncertainty as times of opportunity for new innovation, thereby creating a cycle of creative destruction. From this standpoint, an entrepreneur is not the inventor, but rather the first-mover in acting on a new innovation (Audretsch, 1995). The entrepreneur is not only a risk-taker but also a creator of value who capitalizes on uncertainty and recognizes opportunities that others might not recognize.

Identifying new investment opportunities is a critical dimension of the willingness to innovate in the face of uncertainty. Investment is not merely a response to predefined opportunities but an entrepreneurial act of allocating resources based on subjective considerations about future market conditions (Foss and Klein, 2020). As such, seizing innovation-related investment opportunities requires not only alertness but also the ability to mobilize resources to exploit these opportunities (Kirzner, 1973). The identification of innovation-related investment opportunities is often driven by an entrepreneur's ability to assess potential returns within a specific context (Shane and Venkataraman, 2000).

The Schumpeterian and Kirznerian perspectives emphasize entrepreneurial behaviour under conditions of uncertainty, namely the ability of firms to recognize and act upon opportunities that emerge during periods of economic disruption. From this perspective, Schumpeterian innovation and Kirznerian alertness can characterize a wide range of firms, including incumbent and bank-financed firms, when financial conditions allow them to move beyond short-term survival. During crises, heightened uncertainty and constrained access to credit often force firms to prioritize routine operations and liquidity preservation, diverting attention and resources away from identifying investment opportunities with high innovation potential. By reducing downside risk and relaxing credit constraints, public financial support can enable entrepreneurial behaviour and alertness, thereby facilitating the identification of innovation-related investment opportunities. Thus, we hypothesize that, during a crisis, public financial support helps firms identify new innovation-related investment opportunities. We formalize the following hypothesis:

Hypothesis 2. *During a crisis, public financial support helps firms identify new innovation-related investment opportunities.*

2.5. Public financial support and firm innovation-related investments during a crisis

During crises, public financial support should not only help firms identify investment opportunities but also enable them to invest in such opportunities. This dual function aligns with the entrepreneurial orientation framework (Covin and Wales, 2012), which emphasizes proactive opportunity exploitation. Public financial support plays a critical role in supporting firms' access to outside capital, not only for the purposes of stabilising firms' cash flows and liquidity during adverse conditions, but also in a more forward-looking sense, where investments are required to fund new opportunities for innovation and growth. A balance of working capital and physical investment is indeed critical for firm innovation and growth (Demirgüç-Kunt and Maksimovic, 1998).

During a crisis, when internal cash flows are constrained and external capital markets become more selective and risk-averse, financial slack from public support can be an essential buffer that enables firms to absorb environmental shocks while maintaining the capacity to engage in forward-looking activities (George, 2005). Prior literature has highlighted the role of financial slack in facilitating investment with high potential, particularly during crises. Financial slack allows firms ability to make investments that do not appear justifiable during periods of financing constraints. As such, beyond its stabilizing function, public financial support should serve as a critical enabler of investment activity. We hypothesize that firms receiving public financial support are more likely not only to identify new innovation-related investment opportunities but also to actively invest in such identified opportunities. We formalize the following hypothesis:

Hypothesis 3. *During a crisis, public financial support helps firms invest in identified new innovation-related investment opportunities.*

3. Research design

3.1. Research context

The Covid-19 pandemic was a severe shock to economies across the world, and governments raced to strengthen the liquidity of firms facing lockdown and reduced income streams. In many economies, wage subsidies and grants became the primary public policy responses to the crisis, aimed at supporting workers who were either temporarily laid off or had their working hours significantly reduced (Belitski et al., 2022; Roncancio-Marin and Guerrero, 2024). In the business sector, as governments wrestled with the potential for many firms to fail due to the severe exogenous shock, LGSs were the primary public policy response. While LGSs are commonly used during regular economic conditions, they are often expanded significantly during crises, when banks tend to tighten lending standards and restrict access to credit for businesses (Cowling et al., 2023).

The UK government relied on LGSs as a key public policy response during the Covid-19 pandemic (Kazembalaghi et al., 2025). These schemes provided public guarantees on bank-issued debt with the objective of incentivising traditional banks to continue lending to firms during a period of heightened uncertainty by partially transferring credit risk to the public sector (Gabbiadini et al., 2025; Pellegrini et al., 2026). By alleviating financing constraints and reducing downside risk, LGSs reduced the pressure on firms to focus exclusively on short-term survival, thereby potentially promoting entrepreneurial behaviour under uncertainty as emphasised in Schumpeterian and Kirznerian perspectives, namely the recognition and pursuit of new investment opportunities.

In response to the crisis, the government introduced three specific LGSs, which replaced the existing Enterprise Finance Guarantee (EFG) scheme that had been established during the Global Financial Crisis. These new instruments were designed to support businesses struggling with restricted access to credit. The three schemes each had a different target group. First, the Bounce Back Loan Scheme (BBLS) focused on smaller firms with borrowing requirements up to a ceiling of £50,000, a 100% public guarantee, and a fixed interest rate of 2.5%. The BBLS experienced an unprecedented level of participation, providing around 1 million loans to small businesses, with an average loan amount of £35,000. Second, the Coronavirus Business Interruption Loan Scheme (CBILS) targeted slightly larger SMEs and allowed lending up to £5 m with an 80% guarantee and a risk-adjusted interest rate. Third, the Coronavirus Large Business Interruption Loan Scheme (CLBILS) focused on large corporations. As the UK economy gradually emerged from the Covid-19 pandemic, concerns arose about a potential debt overhang problem, prompting the need for additional public support to recapitalise SMEs. Thus, the Recovery Loan Scheme (RLS) was introduced in April 2021, allowing loans of up to £2 million with a 70% government guarantee.

3.2. Data and sample

Our data source is the Finance and Investment Decision Survey (FIDS). A contractual agreement with the UK Department for Business and Trade and the Bank of England gives us privileged access to this survey, which is intended to help UK policy makers better understand the state of the UK firms' financing in the immediate post-pandemic period (2020–2023) and how they made their business investment and financing decisions. The FIDS is designed by a team of government and academic experts to assess several aspects of firm investments, including investment opportunities, activated investments, how firms financed new investments, and how they decided whether to invest or not to invest. Surveying was conducted in 2023. A survey weight was applied to ensure that the sample statistics were representative of the UK business population in terms of size and industry sector distributions, based on UK business population statistics from the Office for National Statistics. Of particular interest to our study are the survey questions related to the use of UK government Covid-19 LGSs (i.e., BBLS, CBILS, and CLBILS) and the post-pandemic RLS. The survey collects responses on the presence of opportunities to invest and whether the firm made an actual investment (conditional upon identifying a specific type of investment opportunity) for eight types of investments: (1) Land and buildings, (2) Plant, machinery and vehicles, (3) Process innovation, (4) IT, (5) New market development, (6) Product or service innovation (including R&D), (7) Training, and (8) other (unspecified). In total, there are 2,885 firm observations in the sample.

3.3. Variables

3.3.1. Dependent variables

To test Hypothesis 1, we identify firms that identified an investment opportunity. We build a dummy (*Investment opportunity identification*) equal to 1 if the firm answered positively to the question "Did you have an opportunity to invest?", and 0 otherwise. To

test Hypothesis 2, we identify which type of investment opportunity the firm identified. For each of the eight investment types, we build a dummy equal to 1 if the firm identifies an opportunity for the given investment type, and 0 otherwise. We define innovation-related investment opportunities as those associated with "process innovation", "IT", "new market development", and "product/service innovation". To test Hypothesis 3, we identify firms that, conditional upon an innovation-related investment opportunity identification, made the investment. We build a dummy equal to 1 if the firm answered positively to the question "Did you invest in that opportunity?", and 0 otherwise.

3.3.2. Explanatory variable

Our explanatory variable identifies firms that used a Covid-19 LGS. From the survey responses, we build a dummy (*LGS user*) equal to 1 if a firm used a LGS (i.e., BBLS, CBILS, CLBILS, or RLS loan), and 0 otherwise. Overall, 45.79% of the firms in our sample used an LGS during the period 2020–2023.

3.3.3. Control variables

We control for firm characteristics, namely size (micro= 1–9 employees, small= 10–49 employees, medium= 50–249 employees, and large= 250+ employees), age (0–3, 4–10, 11–20, >20 years), industry (Manufacturing; Construction, Wholesale and Retail, Repair of Motor Vehicles; Transportation and Storage; Accommodation and Food Service Activities; Information and Communication; Financial and Insurance Activities; Real Estate Activities; Professional, Scientific and Technical Services; Administrative and Support Services; Public Administration and Defence; Education; Arts, Entertainment and Recreation; Other Service Activities), and region of location (East of England; East of Midlands; London; North East; North West; Northern Ireland; Scotland; South East; South West; Wales; West Midlands; Yorkshire and The Humber).

We account for differences in firms' risk tolerance, as loan applicants may differ in their willingness to bear investment risk (Stiglitz and Weiss, 1981). Risk tolerance is a relevant dimension of entrepreneurial behaviour (Knight, 1921), as risk-tolerant entrepreneurial firms should be more likely to identify innovation opportunities, particularly under uncertainty. We control for firms' tolerance of investment risk using the following question: "I am willing to take risks when considering investments made by the business". Responses are recorded on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Consistent with the Schumpeterian and Kirznerian perspectives, this risk tolerance measure captures firm-level entrepreneurial risk-taking relevant for opportunity identification and investment decisions, rather than bank-side credit risk. This focus is also motivated by the institutional setting of our study: because LGSs are designed to transfer a substantial share of downside risk from banks to the government (through the public guarantee), bank-level risk assessments play a less central role in determining firms' access to credit under these schemes.

Lastly, we control for the firm's use of internal (surplus) funds by considering the question: "Over the past 3 years, which of the following uses has your business made of internal funds?" The responses include: (a) Distributed to shareholders/owners as dividends; (b) Used to buy back company shares; (c) Funded investment in the business; (d) Purchasing financial investments (including mergers with and acquisitions of other companies); e) Used to bolster business cash balances. We include *Build internal cash balances* (i.e., a dummy equal to one if the response is e) and *Fund new investment* (i.e., a dummy equal to one if the response is c or d).

3.4. Model

We are initially concerned that unobserved factors may exert a significant influence on both the use of LGS and a firm identifying an investment opportunity. If we fail to address this potential bias that may be generated by unobserved heterogeneity or reverse causality, then we may generate inconsistent estimates. In our first set of results, we address this issue by using a two-step estimating procedure, which relates to the endogenous treatment effects type of estimation. In the first step, we estimate a selection equation on the probability of a firm using LGSs with a probit model. The second stage involves replacing the dummy *LGS user* variable with the predicted probability of using LGS for the whole sample. The coefficient of this variable gives an estimate of the experimental average treatment effect of LGS on identifying an investment opportunity.

To test Hypotheses 1 and 2, we estimate a set of models of the investment opportunity identification and of the types of opportunity identified using a LGS dummy variable for reference. To test Hypothesis 3, we employ a two-stage sample selection model, as there may be non-randomness in the firms that identify an investment opportunity, specify a particular type of investment, and ultimately make an investment. Specifically, we use a special form of the selection model by deriving the Inverse Mills ratio (IMR), which then enters the second (was the opportunity for X or Y) and third (did you invest in that opportunity) equations. If these terms were significant, then this is evidence that the next step in the firm's decision-making process regarding investment is non-random.

The probit selection type model uses the IMR to correct for selection bias in the sequential process due to potential non-random sampling of firms that identified an investment opportunity. The IMR is calculated from a probit model of the selection process and then enters the main final outcome model on the right-hand side. The IMR, λ, is the ratio of the probability density function to the cumulative distribution function of the standard normal distribution. In the main equation, the coefficient of the IMR indicates whether selection bias is present and the effect on the outcome variable. In our case, all the sequential dependent variables are coded in binary form with a 1 indicating that the firm, for example, had an investment opportunity, had an investment opportunity of a specific type, and finally acted on an investment opportunity of a specific type, conditional upon identifying an opportunity of that type, and 0 otherwise.

Table 1
Investment opportunity by LGS users and non-users.

	LGS non-users		LGS user	
	Mean	Std Dev	Mean	Std Dev
Panel A: Investment opportunity identification	40.59	-	52.73	-
Land and Buildings	18.63	38.97	17.38	37.95
Plant, Machinery and Vehicles	51.52	50.12	55.80	49.73
Process Innovation	13.30	33.98	19.78	39.89
IT	56.82	49.57	61.36	48.76
New Market Development	27.30	44.58	33.72	47.34
Product/Service Innovation	28.36	45.11	37.56	48.49
Training	50.52	50.00	54.97	49.82
Other	14.77	35.51	11.91	32.44
Panel B: Investments in identified opportunities	94.54	-	92.63	-
Land and Buildings	79.39	40.60	81.73	38.94
Plant, Machinery and Vehicles	94.64	22.56	95.67	19.45
Process Innovation	76.44	42.62	83.37	37.46
IT	96.69	17.91	91.39	28.10
New Market Development	87.18	33.52	83.82	36.97
Product/Service Innovation	90.40	29.12	84.14	36.66
Training	96.03	19.16	95.05	21.75
Other	92.83	25.93	88.93	31.77
Observations	1,564	-	1,321	-

Table 2
Use of LGSs and firm identification of an investment opportunity.

Dependent variable:	LGS user	Investment opportunity identification			
	(1)	(2)	(3) Micro	(4) Small	(5) Medium and Large
Predicted LGS user	-	3.6859***	3.5639***	4.2530***	5.8062***
	-	(0.4023)	(0.4451)	(0.9795)	(1.5848)
Small	0.1490**	0.2530***	-	-	-
	(0.0628)	(0.0754)	-	-	-
Medium	−0.0113	0.8469***	-	-	-
	(0.0850)	(0.1180)	-	-	-
Large	−0.6855***	2.6725***	-	-	-
	(0.2266)	(0.2952)	-	-	-
4–10	0.8026***	−1.0285***	−0.9025***	−1.4666***	−6.4277***
	(0.1613)	(0.2016)	(0.2198)	(0.5023)	(0.8782)
11–20	0.7287***	−1.2059***	−1.1479***	−1.3736***	−6.3127***
	(0.1506)	(0.1852)	(0.2008)	(0.4614)	(0.8055)
>20	0.6186***	−0.9724***	−0.9314***	−1.0809**	−5.8394***
	(0.1487)	(0.1737)	(0.1881)	(0.4303)	(0.7933)
Tolerance of Investment Risk	-	0.1911***	0.1955***	0.1528***	0.1594*
	-	(0.0230)	(0.0255)	(0.0540)	(0.0920)
Build internal cash balances	0.3453***	-	-	-	-
	(0.0532)	-	-	-	-
Fund new investment	0.1027**	-	-	-	-
	(0.0508)	-	-	-	-
Constant	−1.3613***	−0.5772***	−0.6183**	0.0583	4.9514***
	(0.2041)	(0.2220)	(0.2403)	(0.5560)	(1.0459)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Regions fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2,880	2,828	1,946	548	274
Pseudo R2	0.0386	0.0992	0.0828	0.1175	0.1582

Notes: The table reports the results of probit models. Variables *Micro* and *0–3* are omitted as reference categories for firm size and age, respectively, to avoid perfect multicollinearity. Model 2 considers the full sample. Models 3, 4, and 5 consider the subsample of micro, small, medium, and large firms, respectively. We use a firm's use of its surplus funds (*Build internal cash balances* and *Fund new investment*) to identify the LGS use equation. These two variables enter only the LGS prediction in Model 1, as we expect that firms retaining free cash for precautionary motives are concerned about the impact of the crisis on their liquidity and survival during the pandemic, and are therefore more likely to use LGS for precautionary reasons as a means of increasing their cash buffers. Equally, firms that are retaining surplus cash to fund new investment are also more likely to use LGS if they perceive that their internal reserves may be insufficient to fund future growth opportunities, or that they face limited access to market finance.

* significance at 10%,.
** significance at 5%,.
*** significance at 1%.

Table 3
Use of LGS and types of investment opportunity identified.

Type of investment	Land and building (1)	Plant, machinery and vehicles (2)	Process innovation (3)	IT (4)	New market development (5)	Product/service innovation (6)	Training (7)	Other (8)
LGS user	−0.0813	0.1236	0.1539*	0.1580*	0.1787**	0.1795**	0.0906	−0.0898
	(0.0941)	(0.0821)	(0.0927)	(0.0823)	(0.0824)	(0.0827)	(0.0799)	(0.0998)
Small	0.0250	0.3771***	0.4570***	0.2906***	0.0034	0.1626*	0.6944***	0.0213
	(0.1083)	0.0954	(0.1002)	(0.0939)	(0.0913)	(0.0929)	(0.0929)	(0.1137)
Medium	0.6311***	0.4325***	0.3422**	0.5273***	0.0160	0.1554	0.6636***	0.0333
	(0.1372)	(0.1393)	(0.1379)	(0.1392)	(0.1267)	(0.1274)	(0.1356)	(0.1674)
Large	1.0960***	0.5586	0.4978	1.7430***	0.2142	0.1193	1.0156***	0.0370
	(0.3839)	(0.3772)	(0.3688)	(0.3463)	(0.3632)	(0.3234)	(0.3678)	(0.4195)
4–10	0.1256	−0.4874**	0.4190	0.3498	0.4559	−0.0381	0.0733	0.0599
	(0.2550)	(0.2380)	(0.2803)	(0.2259)	(0.2390)	(0.2406)	(0.2274)	(0.2882)
11–20	−0.1399	−0.7412***	0.3384	0.1828	0.2421	0.1084	0.0622	0.1655
	0.2434	(0.2242)	(0.2693)	(0.2104)	(0.2276)	(0.2291)	(0.2120)	(0.2713)
>20	−0.0077	−0.5060**	0.3795	0.1805	0.1507	0.2091	−0.0111	0.2850
	(0.2379)	(0.2206)	(0.2685)	(0.2065)	(0.2238)	(0.2254)	(0.2083)	(0.2669)
Tolerance of investment risk	0.0890**	−0.0329	0.1511***	0.0753***	0.1840***	0.1368**	0.0707**	−0.0277
	(0.0414)	(−0.0329)	(0.0417)	(0.0348)	(0.0361)	(0.0354)	(0.0334)	(0.0396)
Constant	−0.5422	1.6235***	−2.7486***	−1.3253***	−2.4626***	−2.0412***	−0.3241	−1.3813***
	(0.3344)	(0.3356)	(0.3972)	(0.3073)	0.3760	(0.3538)	(0.3041)	(0.3739)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regions fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,454	1,454	1,454	1,447	1,454	1,454	1,456	1,399
Pseudo R2	0.0928	0.1501	0.0877	0.1293	0.0744	0.0846	0.0680	0.0701

Notes: The table reports the results of probit models. Variables *Micro* and *0–3* are omitted as reference categories for firm size and age, respectively, to avoid perfect multicollinearity.
* significance at 10%,.
** significance at 5%,.
*** significance at 1%.

4. Results

4.1. Descriptive statistics

Table 1 shows that LGS users have a higher rate of new investment opportunities identification (52.73%) compared to their counterparts (40.59%). This evidence suggests that the large-scale public intervention in the capital market may have had unintended outcomes. While it was primarily aimed at improving firms' liquidity and ensuring their survival through the pandemic, it also appears to have fostered a more forward-looking entrepreneurial dynamic. The proportion of firms that made new investments after identifying opportunities is very high. LGS non-users have a slightly higher rate of new investment conditional upon opportunities identification (94.54%) compared to their counterparts (92.63%). Most of the firms exploited the identified investment opportunities.

Table 1 also shows, for each type of investment, the fraction of firms that identify a new investment opportunity and those that invest conditional upon the opportunity identification. The largest fraction of firms identifying investment opportunities is for IT (56.82% for LGS non-users and 61.36% for LGS-users), Plant, machinery, and vehicles (51.52% for LGS non-users and 55.80% for LGS-users), and Training (50.52% for LGS non-users and 54.97% for LGS-users). The IT effect is consistent with firms seeking to upgrade their technology in order to conduct business in a remote and online way through the lockdown periods when physical contact was restricted.

In terms of exploiting identified investment opportunities, firms perform particularly well in Plant, machinery and vehicles (94.64% for LGS non-users and 95.67% for LGS-users), IT (96.69% for LGS non-users and 91.39% for LGS-users), and Training (96.03% for LGS non-users and 95.05% for LGS-users). Appendix A reports the distribution of firm size, industry, region of location, and risk tolerance by LGS users and LGS non-users. Appendix B reports the correlation matrix for the variables included in the econometric analysis.

4.2. Econometric results

4.2.1. Investment opportunities identification

Table 2 reports the results of the two-step model. In the first step (Model 1), we conduct a probit model to predict the likelihood of a firm using an LGS conditional on firm characteristics. We then use this predicted variable (Predicted LGS user) as the explanatory variable in the second stage (Models 2–5). The results reported in Model 2, using the full sample, indicate that LGS users are more likely

Table 4
Use of LGS and types of investment opportunity identified by firm size.

	Micro	Small	Medium and large
Land and Buildings			
LGS user	−0.0599	−0.1384	−0.0925
Observations	829	333	218
Pseudo R2	0.1095	0.1120	0.2123
Plant, Machinery, and Vehicles			
LGS user	0.0793	0.4145**	−0.0459
Observations	835	358	187
Pseudo R2	0.1590	0.2006	0.2102
Process Innovation			
LGS user	0.1826	0.1239	0.0582
Observations	777	350	224
Pseudo R2	0.0788	0.1069	0.2042
IT			
LGS user	0.1256	0.2216	0.5575**
Observations	829	340	214
Pseudo R2	0.1548	0.1025	0.1659
New Market Development			
LGS user	0.1450	0.3282**	0.5560**
Observations	835	342	224
Pseudo R2	0.0856	0.0955	0.1510
Product/Service Innovation			
LGS user	0.1711*	0.2232	0.4225*
Observations	835	358	224
Pseudo R2	0.1064	0.1189	0.1814
Training			
LGS user	0.0896	0.1010	0.2397
Observations	835	360	218
Pseudo R2	0.0607	0.1030	0.1470
Other			
LGS user	−0.0028	−0.4605**	−0.5054*
Observations	783	341	173
Pseudo R2	0.0777	0.1495	0.1178

Notes: The table reports the results of probit models for the subsamples of micro, small, and medium and large firms. Controls, industry, and regions fixed effects are included in all regressions. Only the coefficients of *LGS user* are reported. *** significance at 1%.
* significance at 10%,.
** significance at 5%,.

to identify investment opportunities, thereby supporting Hypothesis 1. Firm size is positively and significantly associated with the identification of investment opportunities. In line with the Knight and Schumpeter's innovative entrepreneur view, tolerance of investment risk influences the nature of new investment opportunities, with risk-tolerant firms being more likely to identify new opportunities.

Having also calculated the inverse Mills ratio (IMR), we initially tested whether the general presence (or not) of any opportunities for new investment identified by firms was also systematically associated with the identification of specific types of investment opportunity, for example, in land and buildings. In this set of models for each investment opportunity type, we included the general opportunity identification IMR. However, across investment types, there was no statistical evidence that firms that sought out and identified opportunities in general were more (or less) likely to identify a specific opportunity. This suggests that firms conduct more random searches of the environment for new opportunities without having a specific type of opportunity in mind.

We conduct separate regressions for the subsamples of micro (1–9 employees), small (10–49 employees), and medium and large (50+ employees) firms. We expect that reducing capital constraints through LGSs might have different effects on firms of different size classes. Indeed, the results reported in Models 3–5 indicate that the positive effect of LGS occurs for all firm sizes, with the effect increasing as firm size grows.

4.2.2. Types of investment opportunities identified

Table 3 reports the regression results for each type of investment opportunity. Consistent with Hypothesis 2, using LGSs increases the likelihood of identifying innovation-related investment opportunities (i.e., process innovation, IT, new market development, and product or service innovation). Firm size is positively associated with new investment opportunities in land and buildings, plant,

Table 5
Use of LGS and types of investment pursued.

Type of investment	Land and building	Plant, machinery and vehicles	Process innovation	IT	New market development	Product/ service innovation	Training	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LGS user	−0.0269	0.1106	0.3076***	0.0958	0.1927**	0.0990	0.0363	−0.0228
	(0.1047)	(0.0848)	(0.0885)	(0.0843)	(0.0873)	(0.0865)	(0.0825)	(0.1049)
Small	0.0399	0.0562	0.2154	−0.0149	−0.0225	0.0652	0.1344	−0.1008
	(0.1201)	(0.1346)	(0.1417)	(0.1205)	(0.0963)	(0.1025)	(0.1979)	(0.1226)
Medium	−0.1931	0.1177	0.2993**	0.0281	0.0946	0.1285	0.1322	−0.0404
	(0.3426)	(0.1722)	(0.1493)	(0.1856)	(0.1302)	(0.1331)	(0.2106)	(0.1741)
Large	−0.5016	−0.1325	0.1027	0.4927	−0.3682	−0.2291	0.1694	0.0129
	(0.6679)	(0.4276)	(0.3781)	(0.4238)	(0.3440)	(0.2658)	(0.4275)	(0.4406)
4–10	−0.0200	−0.5387**	−0.2759	0.4126*	0.2491	0.1220	−0.0263	0.0358
	(0.2823)	(0.2428)	(0.2415)	(0.2331)	(0.2475)	(0.2541)	(0.2391)	(0.3215)
11–20	−0.2195	−0.6964***	−0.3261	0.1955	−0.0487	0.3181	0.0424	0.2699
	(0.2696)	(0.2254)	(0.2211)	(0.2159)	(0.2335)	(0.2388)	(0.2200)	(0.2987)
>20	−0.0575	−0.4723**	−0.3709*	0.2375	−0.0337	0.4086*	−0.0726	0.3305
	(0.2633)	(0.2216)	(0.2184)	(0.2113)	(0.2290)	(0.2349)	(0.2166)	(0.2935)
Tolerance of Investment Risk	−0.0288	−0.0097	0.0636	−0.0088	−0.0063	0.0187	0.0032	0.0260
	(0.0599)	(0.0362)	(0.0489)	(0.0396)	(0.0570)	(0.0425)	(0.0388)	(0.0421)
Mills selection term	4.4580***	2.3210***	2.0712**	2.9313***	2.8560***	2.1827***	2.4131***	4.5858***
	(1.4926)	(0.7514)	(0.8166)	(0.7199)	(0.6981)	(0.5065)	(0.6852)	(1.4430)
Constant	−1.5816***	−0.7286	−1.0424***	−1.8234***	−1.6547***	−1.8264***	−1.2755***	−2.0463***
	(0.3341)	(0.4501)	(0.2693)	(0.4326)	(0.2983)	(0.2928)	(0.3703)	(0.4104)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regions fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,372	1,372	1,372	1,365	1,372	1,372	1,372	1,365
Pseudo R2	0.1137	0.1471	0.0671	0.1202	0.0759	0.0704	0.0724	0.0801

Notes: The table reports the results of probit models. Variables *Micro* and *0–3* are omitted as reference categories for firm size and age, respectively, to avoid perfect multicollinearity.
* significance at 10%,.
** significance at 5%,.
*** significance at 1%.

machinery and vehicles, IT, and training, but not associated with investment opportunities in new market development or other (unspecified) investments. An inverted U-shaped relationship between firm size and opportunities for process innovation emerges, and a specific small firm effect for product or service innovation. In this sense, small firms were more likely to identify new opportunities in process and product or service innovation. Risk-tolerant firms are more likely to identify new innovation-related investment opportunities.

We conduct separate regressions for the subsamples of micro, small, and medium and large firms. Table 4 shows that, for micro firms, the use of LGSs increased the likelihood of identifying investment opportunities related to product or service innovation ($\beta = 0.1711$*). Small firms that used LGSs increased opportunities identification for plant, machinery and vehicle ($\beta = 0.4145$**), and new market development ($\beta = 0.328$**), while they reduced it for other types of investments (β = -0.4605**). For medium and large firms, LGS increased the likelihood of identifying investment opportunities in IT ($\beta = 0.5575$**), new market development ($\beta = 0.5560$**), and product or service innovation ($\beta = 0.4225$*), while it reduced opportunity identification for other types of investments ($\beta = 0.5054$*).

4.2.3. Investment in identified opportunities

Table 5 reports the results of the decision to invest in an identified investment opportunity or not. In all the models, we include the IMR from the opportunity identification set of models. The positive and significant IMR in all models indicates the presence of selection, meaning that firms that invested after identifying the investment opportunity are a non-random draw from the wider firm population that identified a specific opportunity. Some firms are more likely to identify new opportunities for a specific type of investment, knowing they are more likely to act upon them. This is consistent with the costs of searching out new opportunities and only firms with a higher probability of action being willing to bear these costs.

Table 5 shows that LGS users are associated with a higher probability to invest in identified investment opportunities for process

Table 6
Use of LGS and types of investment pursued by firm size.

	Micro	Small	Medium and Large
Land and Buildings			
LGS user	−0.0320	0.1069	−0.0833
No. Obs	635	341	227
Pseudo R2	0.1004	0.0990	0.1019
Plant, Machinery, and Vehicles			
LGS user	0.0613	0.4342**	0.0156
No. Obs	777	341	227
Pseudo R2	0.1553	0.1853	0.1735
Process Innovation			
LGS user	0.3168***	0.3190**	0.0437
No. Obs	777	341	253
Pseudo R2	0.0788	0.1069	0.2042
IT			
LGS user	0.0737	0.1254	0.3473
No. Obs	771	324	244
Pseudo R2	0.1374	0.0565	0.1481
New Market Development			
LGS user	0.1371	0.4388***	0.5324**
No. Obs	777	326	243
Pseudo R2	0.0902	0.0891	0.0674
Product/Service Innovation			
LGS user	0.0462	0.2960*	0.4133*
No. Obs	777	341	253
Pseudo R2	0.0853	0.0946	0.1632
Training			
LGS user	0.0242	0.0384	0.1021
No. Obs	777	343	251
Pseudo R2	0.0559	0.068	0.0958
Other			
LGS user	0.0712	−0.4222**	−0.4016
No. Obs	739	302	198
Pseudo R2	0.088	0.1358	0.0748

Notes: The table reports the results of probit models for the subsamples of micro, small, and medium and large firms. Controls, industry, and regions fixed effects are included in all regressions. Only the coefficients of *LGS user* are reported.
* significance at 10%,.
** significance at 5%,.
*** significance at 1%.

innovation and new market development, but not for other specific types of investment opportunities, including IT and product or service innovation. Thus, Hypothesis 3 is supported for investment in process innovation and new market development only. These results indicate that firms are seeking to invest in internal productivity-enhancing areas and also in external, new market-facing areas. It may be that investments in process innovation and new market development have a degree of mutually reinforcing synergy, such that improving a firm's internal processes is associated with lower average costs of producing goods and services, and that this may give firms a competitive advantage in their consumer-facing markets. The loan guarantee aspect suggests that firms that were able to improve their liquidity and capital position through public supported loans were also able to adopt a more forward-looking strategic approach to new investment beyond simply surviving the crisis.

The results reported in Table 6 show that small firms were the major beneficiaries of LGSs in terms of investment activation over and above the simple effect of helping them survive the pandemic period. Specifically, the small firms loan guarantee scheme effect was positive and significant in respect of activating investments in plant, machinery and vehicles ($\beta = 0.4342^{**}$), process innovation ($\beta = 0.3190^{**}$), new market development ($\beta = 0.4388^{***}$), and product or service innovation ($\beta = 0.2960^{*}$), but negative and significant for other types of investment ($\beta = -0.4222^{**}$). The results indicate that LGSs were particularly effective for activating innovation-related investments for small firms. Using a LGS increased investment activation in new market development ($\beta = 0.5324^{**}$) and product or service innovation ($\beta = 0.4133^{*}$) for medium and large firms, and in process innovation for micro firms ($\beta = 0.3168^{***}$). This suggests that the value of LGS for micro firms enabled them to manage their way through a crisis by improving their liquidity, with the exception that it helped them reorganise the way they conduct their internal business operations in a more efficient way.

The disaggregated size class results show that the same policy instrument had distinct size class effects, which for micro firms are very direct and survival-related, but for small firms have wider and broader positive effects through not only surviving the pandemic,

but preparing for the future by making strategic investments. For small firms, there is a wider and more long-run effect that is captured through the investment channel, and making new investments that will make them more innovative and growth-oriented in the post-pandemic period. Large firms were able to look at developing their markets and also investing in future products or services.

5. Conclusion

We investigate whether public financial support during a crisis helps firms, including smaller ones, to seize new investment opportunities, especially in innovation. We examine this question in the context of the UK during the Covid-19 pandemic period, which was exceptional in terms of the general shock and the pervasiveness of the effects across firms. The high levels of exogenous uncertainty led to a significant decline in firm investment and a significant increase in public support. We examine whether the public loan guarantee schemes (LGSs) between 2020 and 2023 were simply a means of providing much needed liquidity to firms struggling with diminishing cash flows, or whether there was an unforeseen consequence with a more forward-looking impact on firm investments.

Our results, based on a UK firm-level investment survey covering the period from 2020 to 2023, indicate that firms using LGSs were more likely to identify and pursue new innovation-related investment opportunities. This evidence highlights that public financial support allowed firms to emerge from the crisis with a competitive advantage that may secure their future growth. This is consistent with the Schumpeterian view that not all firms facing crises view this as a threat. Some firms view a crisis as a period when new opportunities arise, while others revert to retrenchment and conservative strategies focused on mere survival.

New investment opportunity identification arises across all firm sizes, including micro and small firms that are typically more constrained during crises. Consistent with relative resource munificence, the effect increases with firm size, such that larger firms identify more opportunities. Firm tolerance for investment risk is also relevant in the identification of innovation-related opportunities, in line with the Knightian and Schumpeterian views of entrepreneurship and entrepreneurial behaviours. In terms of acting on a new opportunity for investment once one has been identified, this was non-random in the sense that firms that sought out and successfully identified new opportunities were also those most likely to act on them. Firms that were less likely to act were reluctant to waste the resources required to identify new opportunities. This might have important consequences as firms that did make new investments in the crisis may become more competitive.

This paper contributes to the literature on firm innovation by documenting that many firms relied on public financial support to identify and pursue innovation investment opportunities during the Covid-19 pandemic period. Beyond securing liquidity for firms to survive, public financial support is critical to unleash firm innovation investments when a firm's capacity to mobilize resources to address innovation opportunities is limited. Financial slack allows firms to direct resources from short-term to more forward-looking objectives. We point attention to public financial support as a critical factor in fostering entrepreneurial alertness, which allows firms to identify opportunities that others may overlook. Despite the generally negative effect on the broader economy, firms using public financial support have a greater ability to seize innovation opportunities arising from a crisis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Firm characteristics by loan guarantee scheme use

	LGS non-users (% of firms)	LGS users (% of firms)
Firm size class		
Micro	87.55	85.09
Small	9.55	13.06
Medium	2.23	1.78

(*continued on next page*)

(*continued*)

	LGS non-users (% of firms)	LGS users (% of firms)
Large	0.26	0.07
	100.00	100.00
Firm age class		
0–3	5.01	2.04
4–10	9.54	12.52
11–20	31.52	35.34
>20	53.93	50.10
	100.00	100.00
Industry sector		
A – Agriculture, Forestry & Fishing	5.13	2.98
B, D, E – Mining & Quarrying, Utilities	0.46	0.23
C – Manufacturing	6.06	7.01
F - Construction	13.79	13.53
G – Wholesale & Retail, Repair of Motor Vehicles	14.74	16.70
H – Transportation & Storage	4.93	4.90
I - Accommodation & Food Service Activities	5.00	8.01
J – Information & Communication	5.71	5.78
K – Financial & Insurance Activities	4.17	3.11
L – Real Estate Activities	2.82	2.76
M – Professional, Scientific & Technical Services	8.54	6.81
N – Administrative & Support Services	3.39	3.86
P – Public Administration & Defence	0.28	0.33
Q – Education	3.74	2.44
R – Arts, Entertainment & Recreation	6.21	7.90
S – Other Service Activities	15.04	13.63
	100.00	100.00
Region		
East	12.96	10.70
East Midlands	7.86	8.57
London	13.52	15.82
North East	2.68	3.07
North West	9.69	9.30
Northern Ireland	1.52	1.39
Scotland	4.23	5.23
South East	19.17	16.16
South West	10.50	10.25
Wales	3.57	4.55
West Midlands	7.12	7.54
Yorkshire & The Humber	7.18	7.41
	100.00	100.00
Willingness to Take Risks when Investing		
Strongly disagree	14.29	10.98
Disagree	22.23	19.18
Neither agree nor disagree	14.74	15.01
Agree	38.42	42.41
Strongly agree	10.32	12.42
	100.00	100.00

Appendix B. Correlation matrix

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
[1] Firm size	1.000												
[2] Firm age	0.033	1.000											
[3] Tolerance of investment risk	−0.012	0.037	1.000										
[4] LGS user	0.019	−0.005	0.072	1.000									
[5] Investment opportunity identified	0.166	−0.034	0.208	0.121	1.000								
Investment opportunity identified													
[6] Land and buildings	0.064	−0.022	0.072	−0.024	-	1.000							
[7] Plant, machinery and vehicles	0.054	−0.003	−0.023	0.032	-	0.018	1.000						
[8] Process innovation	0.092	0.036	0.097	0.057	-	0.004	0.034	1.000					
[9] IT	0.099	0.053	0.067	0.048	-	−0.090	−0.102	0.223	1.000				
[10] New market development	−0.002	−0.006	0.154	0.070	-	−0.021	−0.063	0.292	0.304	1.000			
[11] Product/service innovation	0.028	0.076	0.107	0.058	-	−0.010	−0.032	0.636	0.178	0.325	1.000		
[12] Training	0.170	0.014	0.053	0.025	-	0.051	0.094	0.248	0.350	0.271	0.206	1.000	
[13] Other	0.033	0.019	−0.041	−0.028	-	−0.124	−0.161	−0.064	−0.175	−0.115	−0.099	−0.127	1.000
Investment opportunity activated						[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]
[14] Land & buildings	0.072	−0.023	0.058	−0.016	-	1.000							
[15] Plant, machinery & vehicles	0.052	0.001	−0.022	0.034	-	−0.014	1.000						
[16] Process innovation	0.124	−0.039	0.099	0.090	-	−0.043	0.028	1.000					
[17] IT	0.104	0.049	0.053	0.032	-	−0.094	−0.121	0.245	1.000				
[18] New market development	−0.006	−0.003	0.138	0.068	-	−0.044	−0.050	0.260	0.274	1.000			
[19] Product/service innovation	0.040	0.097	0.089	0.040	-	−0.049	−0.071	0.282	0.137	0.284	1.000		
[20] Training	0.185	0.014	0.045	0.008	-	0.036	0.077	0.323	0.248	0.246	0.161	1.000	
[21] Other	0.026	0.022	−0.030	−0.013	-	−0.108	−0.154	−0.073	−0.141	−0.088	−0.070	−0.114	1.000

Data availability

Replication files are available online in the supplementary material.

References

Aldrich, H., Auster, E.R., 1986. Even dwarfs started small: liabilities of age and size and their strategic implications. Res. Organ. Behav. JAI Press.

Archanskaia, E., Canton, E., Hobza, A., Nikolov, P., Simons, W., 2023. The asymmetric impact of COVID-19: a novel approach to quantifying financial distress across industries. Eur. Econ. Rev. 158, 104509.

Ardichvili, A., Cardozo, R., Ray, S., 2003. A theory of entrepreneurial opportunity identification and development. J. Bus. Ventur. 18 (1), 105–123.

Audretsch, D.B., 1995. Innovation and Industry Evolution. MIT Press.

Audretsch, D.B., Belitski, M., 2020. The role of R&D and knowledge spillovers in innovation and productivity. Eur. Econ. Rev. 123, 103391.

Audretsch, D., Belitski, M., Guerrero, M., Siegel, D.S., 2025. Assessing the impact of the pandemic on digital spin-offs at universities: theory and evidence from the United Kingdom. Strateg. Entrep. J. 1–47.

Audretsch, D.B., Lehmann, E.E., 2025. A knowledge spillover narrative theory of entrepreneurship. J. Technol. Transf. 1–17.

Audretsch, D.B., Link, A.N., 2012. Entrepreneurship and innovation: public policy frameworks. J. Technol. Transf. 37, 1–17.

Auerbach, A.J., Gorodnichenko, Y., Murphy, D., 2021. Inequality, fiscal policy and COVID19 restrictions in a demand-determined economy. Eur. Econ. Rev. 137, 103810.

Bartik, A.W., Bertrand, M., Cullen, Z.B., Glaeser, E.L., Luca, M., Stanton, C.T., 2020. *How are Small Businesses Adjusting to COVID-19? Early Evidence from a Survey* (No. w26989). National Bureau of Economic Research.

Baumann, J., Kritikos, A.S., 2016. The link between R&D innovation and productivity: are micro firms different? Res. Policy 45 (6), 1263–1274.

Belitski, M., Guenther, C., Kritikos, A.S., Thurik, R., 2022. Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses. Small Bus. Econ. 58 (2), 593–609.

Bertoni, F., Colombo, M.G., Quas, A., 2023. The long-term effects of loan guarantees on SME performance. J. Corp. Finance 80, 102408.

Bradley, S.W., Shepherd, D.A., Wiklund, J., 2011. The importance of slack for new organizations facing 'tough' environments. J. Manag. Stud. 48 (5), 1071–1097.

Casey, E., O'Toole, C.M., 2014. Bank lending constraints, trade credit and alternative financing during the financial crisis: evidence from European SMEs. J. Corp. Finance 27, 173–193.

Cattaneo, M., Meoli, M., Vismara, S., 2015. Cross-border M&As of biotech firms affiliated with internationalized universities. J. Technol. Transf. 40 (3), 409–433.

Chatterjee, P., 2024. Uncertainty shocks, financial frictions, and business cycle asymmetries across countries. Eur. Econ. Rev. 162, 104646.

Chowdhury, F., Audretsch, D.B., Belitski, M., 2019. Institutions and entrepreneurship quality. Entrep. Theory Pract. 43 (1), 51–81.

Colombo, M.G., Cumming, D.J., Vismara, S., 2016. Governmental venture capital for innovative young firms. J. Technol. Transf. 41, 10–24.

Covin, J.G., Wales, W.J., 2012. The measurement of entrepreneurial orientation. Entrep. Theory Pract. 36 (4), 677–702.

Cowling, M., Nightingale, P., Wilson, N., 2023. COVID-19 lending support and regional levelling up: evidence from UK loan guarantee schemes. Reg. Stud. 57 (11), 2323–2338.

Cowling, M., Sclip, A., 2023. Dynamic discouraged borrowers. Br. J. Manag. 34 (4), 1774–1790.

Demirgüç-Kunt, A., Maksimovic, V., 1998. Law, finance, and firm growth. J. Finance 53 (6), 2107–2137.

Dorobat, C.E., McCaffrey, M., Foss, N.J., Klein, P.G., 2025. Knightian uncertainty in entrepreneurship research: retrospect and prospect. Entrep. Theory Pract., 10422587251347062

Farè, L., 2022. Exploring the contribution of micro firms to innovation: does competition matter? Small Bus. Econ. 59 (3), 1081–1113.

Fernández-Gallardo, Á., Payá, I., 2025. Public debt burden and crisis severity. Eur. Econ. Rev., 105028

Foss, N.J., Klein, P.G., 2020. Entrepreneurial opportunities: who needs them? Acad. Manag. Perspect. 34 (3), 366–377.

Gabbiadini, M., Meoli, M., Vismara, S., 2025. Geopolitical risk and systemic risk in the European banking system. Finance Res. Lett., 108796

George, G., 2005. Slack resources and the performance of privately held firms. Acad. Manag. J. 48 (4), 661–676.

Gicheva, D., Link, A.N., 2016. On the economic performance of nascent entrepreneurs. Eur. Econ. Rev. 86, 109–117.

Groh, A.P., Guenther, C., Schweizer, D., Vismara, S., 2025. Entrepreneurial finance in an extended period of crises. Small Bus. Econ. 1–14.

Guerrero, M., Link, A.N., 2022. Public support of innovative activity in small and large firms in Mexico. Small Bus. Econ. 59 (1), 413–422.

Guerrero, M., Siegel, D.S., 2024. Schumpeter meets Teece: proposed metrics for assessing entrepreneurial innovation and dynamic capabilities in entrepreneurial ecosystems in an emerging economy. Res. Policy 53 (5), 104984.

Guerrero, M., Urbano, D., 2019. Effectiveness of technology transfer policies and legislation in fostering entrepreneurial innovations across continents: an overview. J. Technol. Transf. 44 (5), 1347–1366.

Guerrero, M., Urbano, D., Herrera, F., 2019. Innovation practices in emerging economies: do university partnerships matter? J. Technol. Transf. 44 (2), 615–646.

Hardy, B., Sever, C., 2021. Financial crises and innovation. Eur. Econ. Rev. 138, 103856.

Kacer, M., Wilson, N., Zouari, S., Cowling, M., 2025. Entrepreneurial finance and the survival of equity-funded firms in crisis periods: the case of COVID-19. Small Bus. Econ. 1–34.

Kahle, K.M., Stulz, R.M., 2013. Access to capital, investment, and the financial crisis. J. Financ. Econ. 110 (2), 280–299.

Kazembalaghi, S., Coakley, J., Liñares-Zegarra, J.M., Vismara, S., 2025. Digital equity and government support during COVID-19. Small Bus. Econ. 64 (4), 1679–1705.

Kirzner, I.M., 1973. Competition and Entrepreneurship. University of Chicago Press, Chicago.

Klein, P.G., 2008. Opportunity discovery, entrepreneurial action, and economic organization. Strateg. Entrep. J. 2 (3), 175–190.

Knight, F.H., 1921. Risk, uncertainty and profit. Hart Schaffner Marx.

Lehmann, E.E., Schenkenhofer, J., Vismara, S., 2025. Hidden champions and knowledge spillovers: innovation-enhancing agglomeration effects and niche technology specificity. Small Bus. Econ. 1–21.

Link, A.N., 2024. Patenting as a public sector innovative response to the Great Recession. J. Technol. Transf. 49 (3), 868–875.

Link, A.N., Scott, J.T., 2012. Employment growth from public support of innovation in small firms. Econ. Innov. New Technol. 21 (7), 655–678.

Link, A.N., Siegel, D.S., 2007. Innovation, Entrepreneurship, and Technological Change. Oxford University Press, Oxford, UK.

Link, A.N., van Hasselt, M., 2019. On the transfer of technology from universities: the impact of the Bayh–Dole Act of 1980 on the institutionalization of university research. Eur. Econ. Rev. 119, 472–481.

Link, A.N., van Hasselt, M., Vismara, S., 2021. Going public with public money. Small Bus. Econ. 57, 1419–1426.

McCaffrey, M., Bylund, P.L., Klein, P.G., 2024. Austrian Economics and Entrepreneurship. Found. Trends® Entrep. 20 (1), 1–108. https://doi.org/10.1561/0300000118.

McMullen, J.S., Fitzsimmons, J.R., Shetty, K., Ramoglou, S., 2024. A temporal typology of entrepreneurial opportunities: implications for the optimal timing of entrepreneurial action. J. Bus. Ventur. 39 (1), 106356.

Meinen, P., Roehe, O., 2017. On measuring uncertainty and its impact on investment: cross-country evidence from the euro area. Eur. Econ. Rev. 92, 161–179.

North, DC, 1990. Institutions, Institutional Change and Economic Performance. Cambridge University Press, Cambridge, UK.

Paeleman, I., Vanacker, T., 2015. Less is more, or not? On the interplay between bundles of slack resources, firm performance and firm survival. J. Manag. Stud. 52 (6), 819–848.

Pellegrini, C.B., Pellegrini, L., Vismara, S., 2026. Climate change and systemic risk: evidence from financial intermediaries. Technol. Forecast. Soc. Change 222, 124408.

Raby, S., Chowdhury, R.H., 2025. Examining the impact of adaptive financial strategies on SME performance: insights from the COVID-19 pandemic. Small Bus. Econ. 1–19.
Ramoglou, S., McMullen, J.S., 2024. "What is an opportunity?": from theoretical mystification to everyday understanding. Acad. Manag. Rev. 49 (2), 273–298.
Ritter, J.R., Signori, A., Vismara, S., 2013. Economies of scope and IPO activity in Europe. Handbook of Research on IPOs. Edward Elgar Publishing, pp. 11–34.
Roncancio-Marin, J., Guerrero, M., 2024. University technology transfer offices' capabilities in responding to societal challenges: lessons from an exploratory study during the COVID-19 pandemic. J. Technol. Transf. 1–24.
Savio, R., Castellaneta, F., Vismara, S., Zattoni, A., 2024. Exploring the third type of agency problem: an empirical study of the impact of debt suspension programmes on SMEs' resource allocations. Br. J. Manag. 35 (4), 1886–1900.
Shane, S., Venkataraman, S., 2000. The promise of entrepreneurship as a field of research. Acad. Manag. Rev. 25 (1), 217–226.
Schumpeter, J.A., 1939. Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process (Volume 1 and 2). McGraw Hill, New York.
Siegel, D.S., Renko, M., 2012. The role of market and technological knowledge in recognizing entrepreneurial opportunities. Manag. Decis. 50 (5), 797–816.
Siegel, D.S., Waldman, D., Link, A., 2003. Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. Res. Policy 32 (1), 27–48.
Siegel, D.S., Wessner, C., 2012. Universities and the success of entrepreneurial ventures: evidence from the small business innovation research program. J. Technol. Transf. 37, 404–415.
Siegel, D.S., Wessner, C., Binks, M., Lockett, A., 2003. Policies promoting innovation in small firms: evidence from the US and UK. Small Bus. Econ. 20, 121–127.
Stiglitz, J.E., Weiss, A., 1981. Credit rationing in markets with imperfect information. Am. Econ. Rev. 71 (3), 393–410.
Townsend, D.M., Hunt, R.A., McMullen, J.S., Sarasvathy, S.D., 2018. Uncertainty, knowledge problems, and entrepreneurial action. Acad. Manag. Ann. 12 (2), 659–687.
Vanacker, T., Collewaert, V., Zahra, S.A., 2017. Slack resources, firm performance, and the institutional context: evidence from privately held European firms. Strateg. Manag. J. 38 (6), 1305–1326.
Wang, L., 2025. Bank financing for SMEs in times of crisis: when "whatever-it-takes" confronts "black swans". Small Bus. Econ. 1–36.