Small Bus Econ
https://doi.org/10.1007/s11187-024-00961-9

RESEARCH ARTICLE

Digital equity and government support during COVID-19

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Accepted: 8 August 2024

Abstract The advent of COVID-19 portended a dire liquidity crunch for small firms as traditional external funding sources were severely curtailed. Defying expectations, initial equity crowdfunding (ECF) campaigns not only withstood the pandemic's onslaught but also saw unprecedented growth in funding volume, investor participation and overfunding. The upshot was that external equity, the traditional funding of last resort, became the first choice. Increased ECF funding especially for seed ventures are likely linked to government-backed loan guarantee schemes that acted as a quality signal for investors. The paper highlights the unanticipated positive synergies between public support mechanisms and private equity dynamics where equity was funding of first choice for many small firms seeking external funding. These developments underscore ECF's central role in digitally channelling equity capital to small firms during a period of heightened economic uncertainty.

Plain English Summary During the pandemic, when physical meetings were restricted, UK equity crowdfunding (ECF) platforms became a crucial lifeline for start-ups, enabling equity financing without face-to-face interactions with investors like business angels. ECF offerings flourished with funding amounts increasing by 15% and investor numbers by 32%. Their success was due to digital due diligence mechanisms that effectively identified high-quality ventures. Moreover, government loan guarantee schemes, including those with full repayment guarantees, provided significant support. Initially, there were concerns about these schemes negatively affecting other finance sources. However, they proved to be a financial lifeline for small firms, enhancing their viability and improving their chances of raising equity capital through Crowdcube. As a result, innovative seed firms thrived during COVID-19 as government aid in the pandemic's first year guaranteed their survival. The main implication is that ECF – a very risky source of finance – flourished during COVID-19 through digital flexibility and government support.

Keywords Equity crowdfunding · COVID-19 · Digital finance · Seed firms

JEL Classification E44 · G01 · G18 · G38 · L26

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Published online: 05 September 2024

1 Introduction

The COVID-19 pandemic was a major exogenous shock to all economies worldwide and it raised the spectre of a doomsday scenario for small firms hit by a combination of lockdown restrictions and an obvious lack of external funding sources (Belitski et al., 2022). The severity of the economic downturn and the scale of the related mortality numbers were unprecedented in recent decades (Altig et al., 2020; Baker et al., 2020). In the UK, the COVID-19 pandemic and related government lockdown restrictions impacted both new startup formation and the survival prospects of existing ventures (Altig et al., 2020; Brown & Cowling, 2021; Brown et al., 2020; Calabrese et al., 2022). This paper examines how equity crowdfunding (ECF) as a leading form of digital finance (Block et al., 2018, 2021) helped young small firms meet the complex challenges the pandemic posed using a sample of 660 successful Crowdcube initial ECF campaigns, 2018–2023. The findings reveal an unexpected surge in ECF performance during COVID-19. The amount of equity raised, number of funders and the degree of overfunding (amount/target) all rose by double-digit figures in contrast to underperforming public equity activity (Paterson et al., 2024) and to the pecking order theory that views external equity as funding of last resort.

This paper builds on recent calls to explore the impact of digitalization on resource mobilization by focusing on ECF as a form of digital equity (e.g. Estrin et al., 2018; Inceoglu et al., 2024) against a background of an upward trend in professional equity investment from 2011. Kacer and Wilson (2023) provide a great overview of equity investment value and number of deals in the UK over the 2011–2022 period. They find that both measures of equity investment trended upward since 2011 to reach a peak in 2020Q1 (beginning of COVID-19). However, they declined in 2020Q2 before recovering in 2021. Deal value reached a new peak in 2022Q1 before it then declined.

The paper makes two contributions to the literature. The first is that it explains why ECF, as a form of digital equity, generally flourished during COVID-19 as part of the general upward trend in equity investment in the UK. This was partly because digital platforms proved more adaptable and resilient than traditional equity providers like business angels (BA) and venture capital (VC) funds and partly because a digital platform became an attractive outlet for professional investors whose traditional day-to-day *modus operandi* involving in-person meetings was curtailed during the pandemic. The COVID-19 pandemic and its associated lockdown restrictions had a negative impact on both BA and VC initial funding rounds (Mason & Botelho, 2021). This adverse effect may have been exacerbated by the limitations on in-person meetings used by professional investors for due diligence, as previously noted by Harrison et al. (2016) in the pre-pandemic context. All this took place against a bleak mainstream financial market backdrop, where the FTSE 100 and the pound sterling posted record-breaking losses (Paterson et al., 2024). The digitalization process was the key to ECF success during COVID-19 as argued below.

A key feature of the recent (post-2016) UK digital equity model is that the ECF campaign lead investor undertakes her own due diligence before making a sizeable investment. She also has to organise a syndicate to commit 20% of the target—a new provision point mechanism (PPM)—before the campaign can go public (Coakley et al., 2024). Here the impact of the lead investor—typically a BA or VC—is akin to that of a third-party prior financing effect (Kleinert et al., 2020). These factors imply that low-quality ventures typically fail to meet the PPM while successful high-quality ventures attract professional investors even in times of increased uncertainty (Fisch & Momtaz, 2020). Conveniently, lockdown measures also prompted BA and VC funds to shift their investment towards ECF platforms (Mason & Botelho, 2021). Concurrently, VC involvement in ECF campaigns had increased as a result of their diversification ("spray and pray") strategy over the past decade where they invested smaller amounts of funding and governance across a broader array of startups (Ewens et al., 2018).

Digital ECF platforms are an ideal outlet in this context because their ownership and exit rights are almost identical to those of typical VC syndicates but within a digital framework. The digitalization of equity finance played a pivotal role in the boost to ECF performance during COVID-19 with platforms predominantly utilizing pre-campaign big data analytics for due diligence, facilitating online funding through ECF platforms and implementing post-campaign digital ownership, monitoring and corporate

governance systems (Coakley et al., 2024; Inceoglu et al., 2024; Kleinert et al., 2022). The resultant increased involvement of professional investors on ECF platforms triggered cascading effects among the crowd and contributed to enhanced ECF performance (Vismara, 2018). The increase in ECF funding of small firms also reflects a broader trend in Western economies involving a shift from public to private equity and where innovative young firms benefit from staying private longer (Ewens & Farre-Mensa, 2022; Vismara et al., 2012).

The paper's second contribution is that it highlights the role of enlightened public intervention in the form of a battery of government policy initiatives in boosting the performance of ECF firms—and seed stage firms in particular—in the critical first year of COVID-19. In particular, loan guarantee schemes (LGS) provided a funding framework to stabilize the financing of small and, especially, seed firms at the height of the pandemic. Government-backed loans played a critical role here as they provided a quality signal that small firms could meet their financial obligations when they become due. On the other, ECF platforms were *ceteris paribus* more likely to view LGS-supported firms as being less risky (due the government guarantee and first-year interest (fees) concession) than equivalent firms without an LGS loan. Seed firms are considered distinctive due to their higher innovation levels, presence in high-growth sectors and a stronger emphasis on cutting-edge technology compared to other small firms. Kleinert et al. (2020) stress that prior financing by BA or VC exerts a strong signaling effect on seed firms. The latter also have lottery stock properties (Bali et al., 2011) such as right-skewed returns which make them highly attractive to professional investors like VCs.

In this context, the government LGS helped young startups and seed firms in particular to overcome the liquidity crisis and related challenges arising during the pandemic until March 2021[1] (Brown & Cowling, 2021). The LGS included the Bounce Back Loan Scheme (BBLS) and the Coronavirus Business Interruption Loan Scheme (CBILS).[2] The 80% government guarantee and lender-set interest rates on CBILS still enabled lenders to carry out their standard due diligence and vetting of borrowers. Borrowers had to provide documents to show they could afford to repay the CBILS loan, such as management accounts, cash flow forecasts, business plans and details of assets (BEIS and BBA, 2020). The lenders remained responsible for their lending decisions under CBILS. Moreover, the lenders included not only the traditional High Street banks but also Fintech lenders such as marketplace (P2P) platforms like Funding Circle and neobanks like Starling. Fintech lenders accounted for a large proportion of LGS loans largely due to their digital due diligence systems that resulted in fast decisions to firms.

The increased demand for equity capital by small firms is consistent with equity as funding of first choice for the smallest firms and with the theoretical model predictions of Fulghieri et al. (2020). The ECF literature provides some evidence of ECF as funding of last resort as the POT predicts (Blaseg et al., 2021; Walthoff-Borm et al., 2018) but their samples do not extend beyond 2015. In other words, they applied to the period of pure ECF (Vismara, 2016) with mainly crowd investors when serious adverse selection problems persisted because due diligence was hampered by the collective action problem. Finally, the Fulghieri et al. (2020) model predicts that firms with pre-existing debt are likely to use equity in follow-on offerings. An unintended consequence of government-backed loans at a time of falling equity valuations was an increase in capital gearing ratios. The recent Cowling and Wilson (2023) findings provide valuable insights into how rising inflation can influence firms' decisions to repay guaranteed loans ahead of schedule. By paying back debt early, firms may enhance

[1] LGS schemes in the UK were extended until June 2021 but only for asset finance lending as global supply chains delayed the delivery of the asset. We are grateful to an anonymous referee for this point. In total they contributed some £1.608 m to small firms.

[2] During COVID-19, the UK government introduced three major Loan Guarantee Schemes (LGSs) two of which aimed at supporting small firms, namely the Bounce Back Loan Scheme (BBLS) and the Coronavirus Business Interruption Loan Scheme (CBILS). These three initiatives helped over 1 million UK businesses, with BBLS being the most widely utilized (Cowling et al., 2023; Cowling et al., 2022). For further details on BBLS and CBILS, see: https://www.gov.uk/guidance/apply-for-a-coronavirus-bounce-back-loan and https://www.gov.uk/guidance/apply-for-the-coronavirus-business-interruption-loan-scheme

their attractiveness to equity investors and improve access to equity financing options in the future.[3] Successful ECF campaigns can then directly assist the firms in recapitalizing and moving their gearing ratios back towards tolerable levels. The role of ECF funding in this context sharply contrasts with the pre-COVID-19 funding of seed firms. Historically, BA and VC funds would invest in seed firms via convertible (loan) notes[4] that offer no immediate ownership or control rights but could be converted to equity at a future Series A round (Weiss, 2023).

The findings on the outperformance of ECF campaigns during the COVID-19 period link to the related literature. They support the early COVID-19 period ECF findings of Vu and Christian (2023) for the UK and the Cumming et al. (2021b) ECF and P2P lending results for the USA. It validates the conjecture of Walthoff-Borm et al. (2018) that ECF can theoretically serve as the primary funding source for private firms during crises (Guenther et al., 2018) as it fosters founder control and provides value-added services like digital corporate governance to investors (Estrin et al., 2018).

The paper's seed firm findings link to the related COVID-19 literature. Calabrese et al. (2022) examined the role of COVID-19 government LGS in supporting UK SMEs and established that the most significant proportion of loans were directed to better-performing micro and small businesses. Brown et al. (2020) found that seed firms accounted for most of the equity funding of small firms during COVID-19. Our paper also contributes to the literature on the effectiveness of UK government LGS during the COVID-19 crisis (Cowling et al., 2022, 2023; Wilson et al., 2023). ECF outperformance was particularly notable during the government LGS period, suggesting a direct and positive impact of government intervention on crowdfunding success, particularly among seed firms.

The remainder of this paper is organised as follows. Section 2 reviews the literature and outlines the hypotheses to be examined. Section 3 provides an overview of the methodology and describes the empirical models employed to test the hypotheses. Section 4 analyses and discusses the empirical findings. The final section concludes.

2 Literature review and hypotheses

2.1 Funding responses to natural disasters

The crises following natural disasters typically have the most detrimental impact on smaller and younger firms' day-to-day business and on their ability to access traditional funding sources such as bank lending (Cortés & Strahan, 2017; Nguyen & Wilson, 2020). Like a natural disaster, COVID-19 represents a major exogenous shock (Baltas et al., 2022; Chandler et al., 2021; Li et al., 2023) and this setting is used to explore shifts in the digital capital raising outcomes of smaller firms. By contrast to a natural disaster, a pandemic involves the outbreak of an infectious disease over entire economies—the world *in extremis*—that generally affects a significant proportion of the population and leaves huge numbers of fatalities in its wake over a prolonged period. The related economic crises lead to more extreme information asymmetries impacting particularly young startups, making access to external—including digital—finance even more challenging. However, recent research indicates that alternative financing might exhibit distinct behavioural patterns during periods of heightened uncertainty (Baltas et al., 2022; Zhang et al., 2015).

COVID-19 highlighted a sharp contrast between the modus operandi of ECF and traditional sources of equity for small firms. Due diligence by traditional VC and BA investors relies on face-to-face contact over a period of time to perform detailed evaluations of prospective startups seeking equity (Cowling et al., 2021; Cumming et al., 2021b). By contrast, ECF platforms rely heavily on digital and and also word of mouth (for example, networks of accountants and lawyers that deal with such ventures) due diligence. Consequently, many professional investors migrated their investments to online ECF platforms during the pandemic (Mason & Botelho, 2021). This was a general trend that had earlier gained momentum with BA (Wright et al., 2015) and with the "spray and pray" venture capital strategy over the past decade where small investments are spread over a wider range of

[3] We are grateful to an anonymous referee for this insight.
[4] Detailed information on VC investments is extremely difficult to obtain. See this link for UK VC. https://www.osborneclarke.com/insights/vc-focus-why-vcs-and-companies-use-convertible-loan-notes-and-bridging-rounds-uk. Weiss (2023) confirms a similar pattern in the USA.

startups (Ewens et al., 2018). Note that such investments in an ECF campaign by BA or VC would serve as a strong prior financing signalling effect leading to potential cascading behaviour by other investors (Meoli & Vismara, 2021; Vismara, 2018).

2.2 Pecking order theory

The traditional pecking order theory (POT) posits that firms prefer internal to external funds due to adverse selection costs (Myers & Majluf, 1984) and, among external funds, they prefer debt to equity. POT was developed at a time when public equity—given by stock exchange flotation—was in the ascendancy. However, recent decades have witnessed a move in the opposite direction with a fall in public (listed) firms and a simultaneous rise in private firms (Ritter et al., 2013). The empirical study of Lattanzio et al. (2023) confirms this trend for developed economies and shows that it emerged earlier (in the mid-1990s) in the UK and USA relative to other developed economies. The shift in Western economies from public to private equity is driven by factors such as the increased costs of regulation on stock markets (public equity) and the fact that the deregulation (e.g. allowing the establishment of ECF platforms) of the private equity markets enhances the benefits to small firms of remaining private (Ewens & Farre-Mensa, 2022; Momtaz, 2023).

The COVID-19 pandemic had a dual effect on the equity financing of firms. On the one hand, it exerted a direct effect on the professional investors (VC and BA) that traditionally supplied private equity but who suffered due to lockdown restrictions (Brown et al., 2020; Mason & Botelho, 2021). More generally, COVID-19 led to sharply increased uncertainty for public equity (Brown & Rocha, 2020) which drove down stock exchange valuations and hampered the IPO markets. The latter are quite sensitive to the negative mood in the markets. Paterson et al. (2024) report that the FTSE 100 and pound sterling witnessed record-breaking losses during the COVID-19 period that would have depressed the IPO market also. In other words, public equity finance was strictly rationed during COVID-19.

On the other hand, the pandemic-induced shift from traditional to digital finance is clearly illustrated by the performance of ECF campaigns. How does this link to POT? Researchers such as Walthoff-Borm et al. (2018) and Blaseg et al. (2021) find that ECF was the funding of last resort for ECF samples of UK and German firms, respectively, which is in line with the traditional POT. However, their ECF samples end in 2015 and so belong to the pure ECF era (Vismara, 2016) where small investors dominated ECF campaigns giving rise to the collective action problem where investors tend to free ride on others. By contrast, the post-2016 syndicated ECF model with a lead investor (Coakley et al., 2024) has transformed the role of professional investors in ECF as it has leveraged their due diligence and monitoring skills to attract high-quality investors to their campaigns. In particular, the provision point mechanism of requiring the lead investor syndicate to commit to a minimum of 20% of the target prior to the campaign going public is a game changer in terms of sharply improving the quality of small firms permitted to run initial ECF campaigns. Moreover, Kleinert et al. (2022) provide survey evidence that the stringent due diligence standards imposed by ECF platforms across a range of countries imply that only high-quality ventures are permitted to run ECF campaigns. For such firms, ECF is funding of first resort. In this context, Walthoff-Borm et al. (2018) were prescient in arguing that ECF could theoretically be funding of first resort as it permits founder control and offers value-added services like visibility and feedback.

2.3 Hypothesis

The development and growth of digital finance platforms such as ECF, marketplace lending and other digital finance providers (e.g. market invoice or the prepayment of invoices for a fee) began in the wake of the Great Financial Crash. The COVID-19 lockdown restrictions curtailed traditional investor activities which relied heavily on face-to-face due diligence. This provided ECF platforms with a unique opportunity to attract more professional investors, thereby enhancing campaign performance through a BA or VC certification effect. These investors responded by investing in ECF either as lead investors in syndicated ECF campaigns or by diversifying their investment risk across a range of ECF campaigns in a period of heightened risk. Additionally, they were drawn to the bespoke value-added services provided by the platform (Walthoff-Borm et al., 2018). These include a digital nominee corporate governance structure that

monitors ECF firms and protects the ownership and exit rights of all investors (Coakley et al., 2024).

The COVID-19 boost to digital finance is exemplified by initial ECF campaigns run by high-quality startups during the pandemic period. These new equity injections would help to boost their funding performance relative to those in the pre-COVID-19 period as outlined in H1A:

H1A*: Initial ECF campaigns launched during the COVID-19 period outperform those of the pre-COVID-19 period.*

During the post-COVID-19 period, the crisis factors that previously boosted ECF outcomes no longer apply and so funding outcomes tended to revert to their pre-COVID-19 patterns boosted by additional government support in the form of the Recovery Loan Scheme. This leads to H1B:

H1B*: Initial ECF campaigns launched during the post-COVID-19 period perform similarly to those of the pre-COVID-19 period.*

The other novel factor that impacted ECF during COVID-19 was government intervention on an unprecedented scale aimed at reducing capital-raising barriers for small firms generally but for seed firms in particular (Calabrese et al., 2022; Cowling et al., 2023; Feyen et al., 2020; OECD, 2020). The UK government supported SMEs financially through schemes like the BBLS, CBILS (Coronavirus Business Interruption Loan Scheme) and others. These were aimed at addressing market imperfections by offering government loan guarantee schemes (LGS) to smaller (seed- and early-stage) firms during the systemic liquidity crisis resulting from the COVID-19-induced sudden drop in revenues (Cowling et al., 2023). In the UK, more than 1 million businesses accessed these schemes (Cowling et al., 2023). Calabrese et al. (2022) find that some 92% of the debt funding provided during this period was backed by the UK government, swamping the usual support level of under 5%.

Jibril et al. (2021) using survey data from the SME Finance Monitor for Q3 and Q4 2020 report a positive short-term effect of the policy instruments employed by the UK government. Wilson et al. (2023) observed that patterns of insolvency during the COVID-19 pandemic differed from those of previous crises. Notably, there was an initial decline in insolvency rates, particularly in the first year of COVID-19. In such circumstances, it is highly likely that, *ceteris paribus*, ECF platforms would target small firms with a government-back loan over those without such backing. This leads to the following hypothesis on the government LGS and their impact on ECF campaigns.

H2A*: The availability of government loan guarantee schemes in the first year of COVID-19 positively impacted ECF campaign performance.*

The LGS targeted small and young startups. Among the latter, seed firms are typically younger, riskier and often more innovative than early-stage and growth firms. The literature suggests seed firms usually struggle to secure outside funding, especially during periods of heightened uncertainty (Baltas et al., 2022). The substantial challenges encountered by such firms at the onset of the COVID-19 crisis (January 2020–March 2020) are consistent with these observations, as noted by Brown et al. (2020). The traditional investors in seed firms in normal times are mostly BA (Block et al., 2019) and VC (Weiss, 2023). ECF platforms during the pandemic presented such investors with two unique advantages for investing directly in seed firms.

First and crucially, investors could immediately acquire direct equity stakes in seed firms via ECF instead of potential deferred equity acquired via convertible notes. While the government support packages exerted an overall positive effect on seed firms, they had one unintended side effect: the resultant debt increases inflated their leverage ratios, especially at a time of falling equity valuations. This made equity injections even more urgent (Calabrese et al., 2022; Cowling et al., 2023; Jibril et al., 2021). The related second advantage of ECF in this context was that the availability of government-backed loans paved the way for a private equity injection by BA of VC. Since higher-performing micro and small firms were the primary beneficiaries of government loans (Calabrese et al., 2022), these firms were able to pass both ECF platform checks (Kleinert et al., 2022) and lead investor due diligence in raising initial ECF funds during the COVID-19 period. Fulghieri et al. (2020) offer another rationale that applies in this context. Firms

that already have debt are more likely to use equity in follow-up offerings. This leads to H2B on the outperformance of seed firms.

H2B: *Seed firms exhibit improved ECF performance compared to other ECF firms during COVID-19.*

3 Methodology

The COVID-19 pandemic was an exogenous shock that provides a singular research opportunity for examining the capital-raising performance of firms on ECF platforms. This study employs a categorical variable regression to analyse differences in performance between campaigns in the pre-COVID-19, COVID-19 and post-COVID-19 periods. Variations in ECF performance are given by the logged values of the Amount raised, number of Funders and Overfunding (Amount/Goal) outcomes. All regressions take account of industry-fixed effects. The categorical variable (COVIDcat) takes the value of 1 for campaigns conducted during the pre-COVID-19 period (January 2018–February 2020), 2 for campaigns during COVID-19 (March 2020–December 2021) and 3 for post-COVID-19 campaigns (December 2021–October 2023). A dummy variable (LGS_d), taking the value of 1 for the duration of the government's COVID-19 loan schemes in 2020–2021, is employed to examine their effects.[5]

The empirical setting of this study comprises 660 initial ECF offerings on the Crowdcube platform from January 2018 to October 2023. Campaigns that offer convertibles or debt (bonds) are not included. The dataset comprises just initial ECF campaigns as follow-on ECF campaigns can potentially benefit from a positive certification effect from a successful initial campaign (Coakley et al., 2022a). The choice of the platform and the sampling criteria are in line with most previous ECF studies (e.g. Cerpentier et al., 2022; Coakley et al., 2022a, 2024; Estrin et al., 2018; Walthoff-Borm et al., 2018). Several control variables are included to account for the observable heterogeneity in firms seeking to raise ECF funds. Ln(Goal (£m)) refers to the natural logarithm of the goal (target) set at the beginning of the campaign. Under the All-or-Nothing provision point mechanism, startups can retain the raised capital if and only if they reach or exceed this threshold (Cong & Xiao, 2024). Equity offered (%) is a reliable signal of the entrepreneur's confidence in the firm. Ceteris paribus, the more confident she is about her firm (project), the smaller the equity share she is prepared to sell to outsiders (Ahlers et al., 2015; Vismara, 2016).

Firm-related characteristics include Pre-money Valuation (£m), which is the agreed valuation of a firm (jointly by the founder(s) and platform) prior to the initial ECF campaign and is a proxy for the size (Coakley et al., 2022a). Firm size is positively associated with the ability to survive disasters or crises (Baltas et al., 2022). Firm stage is a categorical variable for three types of young firms involved in ECF campaigns: seed, early stage and growth stage. Founder Team size can affect ECF outcomes and the literature suggests that a higher number of founders is associated with higher success in ECF (Coakley et al., 2022b). An Enterprise Investment Scheme (Weiss) tax relief dummy, which equals one for firms using this scheme and zero otherwise (Vu & Christian, 2023), captures potential professional investor involvement. The number of Views and Followers of the campaign on the Crowdcube platform is used to proxy for the social capital and visibility of firms. This has an important signalling role from the investor's perspective (Vismara, 2016) and a visibility role from the firm's viewpoint (Walthoff-Borm et al., 2018). Finally, industry dummies are used to control for industry-fixed effects and capture the unobservable traits of each industry.

3.1 Regression models

The estimation method employed is ordinary least squares (OLS) and robust standard errors are reported in all tables. The following model is used to test hypotheses H1A and H1B, where the ECF performance for each campaign is proxied by the

[5] As part of a robustness check, additional analysis incorporating the interaction of LGS_d and COVIDcat was conducted. The results are consistent with those presented in our main model in Table 6.

natural logarithm of Amount, Funders and Overfunding (Amount/Goal) ratio[6]:

$$Ln\left(ECF\ performance_i\right) = \alpha_1 + \beta_1\ COVIDcat + \Gamma_1 Controls_i + \varepsilon_1 \quad (1)$$

where i denotes campaign i and $Controls_i$ represents a vector of control variables as defined in Table 8 in the Appendix. The categorical variable COVIDcat can be rewritten in the form of two dummies with associated β_{11} and β_{12} coefficients, respectively:

$$Ln\left(ECF\ performance_i\right) = \alpha_1 + \beta_{11}\ COVID\_Pre + \beta_{12} Post\_Pre + \Gamma_1 Controls_i + \varepsilon_1 \quad (1.1)$$

The coefficients β_{11} and β_{12} respectively capture the initial and net impacts of COVID-19, compared to the performance metrics of the pre-COVID-19 base period.

The following two models are employed to test hypotheses H2A and H2B:

$$Ln\left(ECF\ performance_i\right) = \alpha_2 + \beta_2 LGS\_d + \Gamma_2 Controls_i + \varepsilon_2 \quad (2)$$

$$Ln\left(ECF\ performance_i\right) = \alpha_3 + \beta_{31} Seed\_d + \beta_{32} COVID\_d + \beta_{33} Seed\_d \times Covid\_d + \Gamma_3 Controls_i + \varepsilon_3 \quad (3)$$

The primary explanatory variable in Model (2) is LGS_d which is equal to 1 for the period during which the UK government loan schemes (BBLS and CBILS) were offered and 0 otherwise (both during the COVID-19 period). The main coefficient of interest in Model (3) is β_{33} which is the interaction of seed firm campaigns with the COVID-19 period. This shows the effect of being a seed stage firm for ECF initial campaign outcomes during COVID-19 compared to the non-COVID-19 period.

3.2 Robustness analysis

Several robustness tests were performed to evaluate the robustness of the results. Model (1) is re-estimated using a COVID-19 dummy to examine the results of hypotheses H1A and H1B. Here, the comparison is between the COVID-19 sample (Covid_d = 1) period campaigns and the remaining sample campaigns (Covid_d = 0). As a robustness test of H2A, Model (2) is re-estimated for the first year of COVID-19 (March 2020–December 2021), contrasting the period when government loan schemes were available with all other periods. Propensity score matching (PSM) is employed to examine the robustness of the H2B results. This method has been used by several ECF and COVID-19 studies to deal with endogeneity (Coakley et al., 2022b; Li et al., 2023; Vismara, 2019). The use of PSM here seeks to answer the following question: are seed firms during the COVID-19 period, *ceteris paribus*, less/more likely to outperform when compared with counterfactuals in the non-COVID-19 period matched on Goal (£m), Equity (%), Pre-money Valuation (£m) and Team Size.[7] Here the sample includes seed firms.

4 Data and empirical analysis

The section analyses 660 initial ECF campaigns on Crowdcube, the leading UK-based ECF platform. Data were collected from the platform using a customised program designed for information scraping. Because the process is automated, it is largely free of potential human error. When the necessary information is unavailable, the dataset is supplemented by data obtained from Companies House (Cerpentier et al., 2022; Vismara, 2019). The dataset covers three distinct periods, as shown in Table 1.

This gives the distribution of campaigns across three (approximately) 2-year sample periods. Nearly one-third (33.66%) of the campaigns were conducted during the actual COVID-19 period, with a greater number occurring pre-COVID-19 and fewer afterwards. It also shows that government LGS were available for over half (54%) of COVID-19 period campaigns.

4.1 Descriptive statistics

Table 2 reports the summary statistics for the variables defined in Table 8 in the Appendix.

[6] The estimation results of this model using a post-COVID-19 dummy (post-COVID-19 campaigns vs. COVID-19 campaigns) are presented in Table 13 in the Appendix for the robustness tests of H1A and H1B.

[7] The post-estimation results of this method are available in Table 14 and Figure2 in the Appendix.

Table 1 Campaign distribution. Sub-sample periods

		No. campaigns	Percent
Pre-COVID-19	January 2018–February 2020	256	40.65%
COVID-19	March 2020–December 2021	209	33.66%
	LGS available	113	
	LGS unavailable	96	
Post-COVID-19	December 2021–October 2023	195	25.69%
Total		660	

The COVID-19 period ended in mid-December 2021

Table 2 Descriptive statistics

Variable	Mean	Median
Amount (£m)	0.79	0.48
Funders (k)	0.67	0.38
Overfunding	1.82	1.43
Goal (£m)	0.44	0.3
Equity (%)	11.11	9.37
Pre-money Valuation (£m)	12.25	4.53
Team size	1.35	1
Firm stage	1.95	2
EIS	0.73	1
Followers (k)	1.21	0.7
Views (k)	28.49	19.26

This table displays the summary statistics for the variables used in our empirical analysis

Table 2 highlights the presence of right-skewness for the outcome variables Amount, Funders and Overfunding, as their means are all substantially greater than their corresponding medians. Hence, these variables are logged in the empirical analysis to mitigate the impact of outliers. Table 2 shows that firms offer, on average, 11.11% (median of 9.37%) of their equity capital, implying that founders clearly retain majority control. The median Pre-money Valuation is £4.53 m, and the median Team Size is 1, indicating that solo founders predominate. Approximately 73% of the campaigns include an EIS option to attract professional investors through tax relief schemes.

Figure 1 shows the mean value of the ECF campaign outcomes and the campaign goals over the three COVID-19 periods.

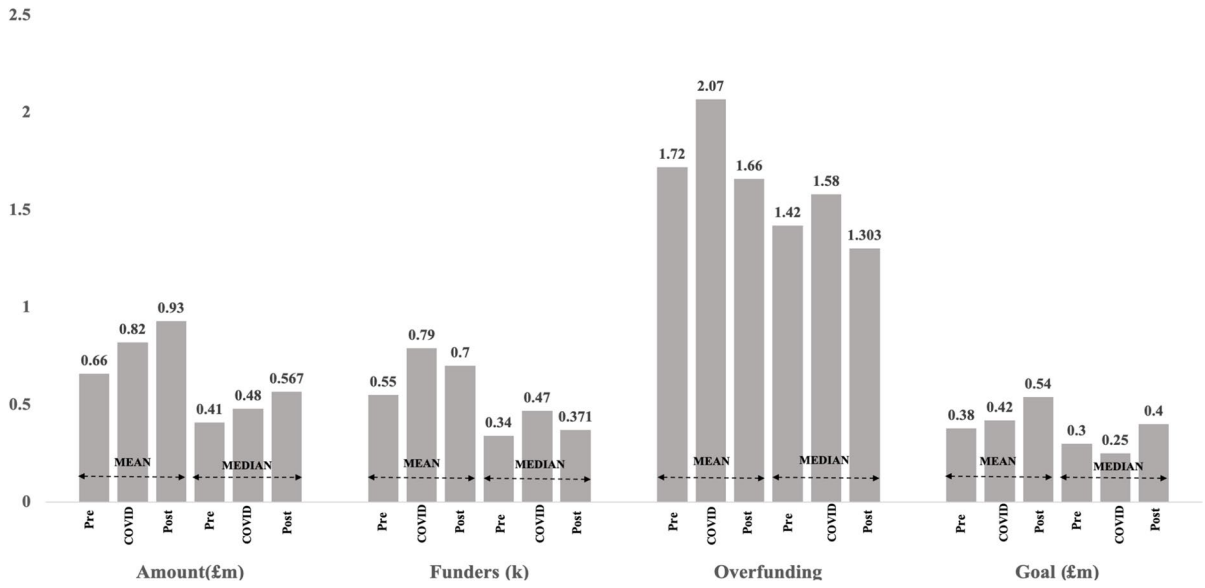

Fig. 1 ECF outcomes (pre-, COVID-19 and post-COVID-19). Note: This bar chart depicts the mean and median values for Amount (£m), Funders (k), Overfunding and Goal (£m) for the pre-, COVID-19 and post-COVID-19 periods. The dataset includes successful initial ECF campaigns on Crowdcube from January 2018 to May 2023

Table 3 Firm stage and COVID-19

	Pre-COVID-19 campaigns		COVID-19 campaigns		Post-COVID-19 campaigns		All campaigns	
	(*N*)	(%)	(*N*)	(%)	(*N*)	(%)	(*N*)	(%)
Seed	48	26%	81	39%	20	14%	149	28%
Early-stage	96	52%	81	39%	92	63%	269	50%
Growth-stage	42	23%	45	22%	33	23%	120	22%
Total	186	100%	207	100%	145	100%	538	100%

This table presents the number (%) of campaigns based on firm stage for the pre-COVID-19, COVID-19 and post-COVID-19 periods
The total COVID-19 campaigns is 207 as firm stage data are missing for 2 firms

The Amount raised in initial campaigns increased in the pre-COVID-19 period and continued to grow thereafter. Simultaneously, the average funding goal (the amount requested by ventures) is on the rise. This ongoing increase in funding goals chimes with the Beauhurst (2022) observation that the ECF market is increasingly attracting more established firms. As the market evolves, it attracts an increased presence of professional investors (Coakley et al., 2024) alongside the crowd. The observed decrease in the median value of funding goal during the COVID-19 period, contrasted with an increase in its mean value, can be attributed to a higher number of successful initial campaigns by seed firms during the pandemic, while (large) outliers have concurrently driven up the average value. The COVID-19 period attracted the highest number of Funders and the greatest degree of Overfunding (Amount/Goal) and both exhibit concave patterns over the sample period.

Table 3 provides a breakdown of ventures running initial ECF campaigns into seed, early-stage and growth categories. Prior to COVID-19, more than half (52%) of the ventures were early stage, with the remaining firms distributed between seed (26%) and growth-stage (23%) categories. The proportion of seed firms jumped to 39% during the pandemic but fell sharply to just 14% during the post-pandemic period. Correspondingly, the share of early-stage firms rose from 39% during COVID-19 to some 63% post-COVID-19. The share of growth-stage firms remained stable at 22–23% over the sample period. Table 9 in the Appendix presents the pairwise correlation coefficients between all variables included in the regression analysis. Except for the first three columns involving the dependent variables, none of the pairwise correlations exceed 0.6.

Table 4 displays the test results for equality of mean and median (nonparametric Pearson chi-square) for COVID-19 vs. pre-COVID-19 and post-COVID-19 vs. pre-COVID-19 variables. Panel A shows that the COVID-19 mean and median values of Funders, Overfunding and Pre-money Valuation are significantly larger than their pre-COVID-19 counterparts at the 5% level or better (the mean Amount is also considerably larger). Panel B shows that both the post-COVID-19 mean and median values of Amount, Goal and Pre-money Valuation are significantly larger than their pre-COVID-19 levels at a 5% significance level or better, while the Equity (%) share sold is significantly smaller. The mean and median difference of Funders and degree of Overfunding are both insignificant.

4.2 Regression results

Table 5 presents the results of the categorical variable regression models. These serve to evaluate the performance of ECF campaigns over both the COVID-19 and post-COVID-19 periods relative to the baseline pre-COVID-19 period. The primary explanatory variables are *COVID_Pre* and *Post_Pre* in these models. The former gives the COVID-19 effect or the difference between the COVID-19 and pre-COVID-19 periods. The coefficient on Post_Pre gives the difference between the post-COVID-19 and pre-COVID-19 periods, or the net COVID-19 effect. The dependent variables are the performance metrics *Ln(Amount), Ln(Funders)* and *Ln(Overfunding)* in Models 1 and 2, 3 and 4, and 5 and 6, respectively. The second model in each pair (for example, Model 1 in the Model 1 and 2 pair) adds industry-fixed effects (FE) to the relevant regression.

Table 4 Equality of means and median tests

Panel A. COVID-19 vs. pre-COVID-19						
	COVID-19		Pre-COVID-19			
Variables	Mean	Median	Mean	Median	Mean difference	Median difference
Amount (£m)	0.82	0.48	0.66	0.41	0.16**	0.07
Funders (k)	0.79	0.47	0.55	0.34	0.24***	0.13***
Overfunding	2.07	1.58	1.72	1.42	0.35***	0.16***
Goal (£m)	0.42	0.25	0.38	0.3	0.04	-0.05
Equity (%)	12.79	9.24	11.83	11.78	0.96	-2.54**
Pre-money Valuation (£m)	11.89	4.31	7.58	3	4.31**	1.31**
Team size	1.4	1	1.31	1	0.09	0
Firm Stage	1.83	2	1.97	2	-0.14*	0
EIS	0.68	1	0.72	1	-0.04	0
Followers (k)	1.38	0.84	1.12	0.65	0.25	0.19*
Views (k)	32.5	19.33	28.75	20.87	3.76	-1.54
Panel B. (Post-COVID-19 vs. pre-COVID-19)						
	Post-COVID-19		Pre-COVID-19			
Variables	Mean	Median	Mean	Median	Mean difference	Median difference
Amount (£m)	0.93	0.567	0.66	0.413	0.27***	0.154***
Funders (k)	0.7	0.371	0.55	0.335	0.15	0.036
Overfunding	1.66	1.303	1.72	1.424	−0.06	−0.121
Goal (£m)	0.54	0.4	0.38	0.3	0.16***	0.1***
Equity (%)	8.27	6.31	11.83	11.78	−3.56***	−5.47***
Pre-money Valuation (£m)	18.97	7.5	7.58	3	11.39***	4.5***
Team size	1.35	1	1.31	1	0.04	0
Firm stage	2.09	2	1.97	2	0.12*	0
EIS	0.78	1	0.72	1	0.06	0
Followers (k)	1.05	0.6	1.12	0.65	−0.11	−0.05
Views (k)	22.61	16.15	28.75	20.87	−5.96*	−4.72***

Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Table 5 ECF campaigns: COVID-19 vs. pre-COVID-19, post- vs. pre-COVID-19 results

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(Amount (£m))	Ln(Amount (£m))	Ln(Funders (k))	Ln(Funders (k))	Ln(Overfunding)	Ln(Overfunding)
COVID_Pre	0.139***	0.136***	0.273***	0.281***	0.117***	0.122***
	(3.24)	(3.12)	(4.89)	(5.05)	(2.62)	(2.66)
Post_Pre	0.0661	0.0734	−0.0063	−0.00428	−0.00927	0.00229
	(1.41)	(1.60)	(−0.0857)	(−0.0612)	(−0.208)	(0.05)
Ln(Goal (£m))	0.840***	0.835***	0.222***	0.192***		
	(29.10)	(29.05)	(5.16)	(4.96)		
Equity (%)	0.00350**	0.00357**	−0.000147	−0.00103	0.00148	0.00156
	(2.49)	(2.29)	(−0.0519)	(−0.355)	(1.14)	(1.10)
Pre-money Valuation (£m)	0.00049	0.000628	−0.000887	−0.000927	−0.000605	−0.000416
	(0.39)	(0.50)	(−0.486)	(−0.539)	(−0.634)	(−0.429)
Team size	−0.00927	−0.0058	0.00107	0.00702	−0.0156	−0.00964
	(−0.402)	(−0.249)	(0.03)	(0.22)	(−0.651)	(−0.392)
Firm stage	0.0539*	0.0566*	0.0626	0.0639	−0.021	−0.02
	(1.87)	(1.91)	(1.48)	(1.64)	(−0.814)	(−0.758)
EIS	0.0970**	0.0924**	0.125**	0.091	0.0821**	0.0752*
	(2.54)	(2.39)	(2.24)	(1.63)	(2.13)	(1.93)
Views (k)	0.000587	0.000667	0.00554**	0.00570***	0.000209	0.000219
	(0.67)	(0.77)	(2.40)	(2.62)	(0.28)	(0.30)
Followers (k)	0.111***	0.103***	0.213***	0.196***	0.107***	0.100***
	(4.07)	(4.05)	(3.43)	(3.56)	(4.74)	(4.68)
Constant	−0.122	−0.0349	5.592***	5.528***	0.319***	0.459***
	(−1.089)	(−0.209)	(33.77)	(28.82)	(4.41)	(2.90)
Industry FE	No	Yes	No	Yes	No	Yes
Observations	487	487	487	487	487	487
Adjusted *R*-squared	0.851	0.852	0.596	0.642	0.222	0.228

The dependent variable in Models (1), (3) and (5) is the natural logarithms of Amount, Funders and Overfunding (Amount/Goal), respectively, and the key coefficients of interest are those of COVID_Pre and Post_Pre. The estimation method is ordinary least squares (OLS). Models (2), (4) and (6) are the same as (1), (3) and (5), respectively, but include industry-fixed effects. The standard errors are robust. The dataset consists of successful initial ECF campaigns on Crowdcube from January 2018 to October 2023. Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Virtually, all small firm capital gearing ratios were sharply inflated during COVID-19 by a combination of increasing debt levels and lower equity valuations as a result of increasing risk levels and little or no retained earnings. Debt levels rose due to the liquidity crisis from falling sales revenue and the need for additional funds, including from government-backed loans. Note that the Amount of ECF funds raised directly increases a firm's equity and, ceteris paribus, improves its gearing ratio. Thus, the Amount raised is the most salient performance metric in our regression analysis. It should be noted that the mean (median) Amount raised was a considerable £790 k (£480 k) for the full sample.

The COVID-19 effect (*COVID_Pre*) is significantly positive at the 1% level in Models (1) and (2), indicating that the COVID-19 period campaigns raised a significantly larger Amount (of equity) than their pre-COVID-19 counterparts. In Model (2) with industry FE, the coefficient is 0.136, suggesting that Amount raised by COVID-19 campaigns is 14.6% ($e^{.136} - 1 = 0.146$) higher than their pre-COVID-19 counterparts. Such considerable levels of new equity helped ventures in reducing gearing ratios. This supports H1A.

The performance variable used in Models (3) and (4) is *Ln(Funders)*. The COVID-19 effect (*COVID_Pre*) is significant at the 1% level in Model (4). Its value implies that the number of funders during COVID-19 was some 32% ($e^{.281} - 1 = 0.324$) higher than that in the pre-COVID-19 period. This is an impressive increase in funders and likely reflects large numbers of crowd investors attracted by the increasing involvement of BA and VC investors in ECF campaigns. Models (5) and (6) employ *Ln(Overfunding)* as the dependent variable. The COVID-19 effect (*COVID_Pre*) in Eq. (6) is significantly positive at the 1% level. This implies that COVID-19 campaigns enjoyed a 13% ($e^{.122} - 1 = 0.13$) increase in the Overfunding ratio relative to pre-COVID-19 campaigns. Both Model (4) and (6) results also clearly support H1A. Our findings for the full pandemic period extend the results of Cumming et al. (2021b) and Vu and Christian (2023) for the early months of COVID-19 in the USA and UK, respectively, to the full COVID-19 period. They showcase the outperformance of ECF campaigns during the full COVID-19 period using three different metrics. The increases reported above range from 13% for Overfunding and 14.6% for Amount raised to 32% for Funders.

Finally, note that the coefficients on *Post_Pre* are statistically insignificant across all six regressions in Table 5. These imply that the post-COVID-19 funding performance was not significantly different from the pre-COVID-19 funding performance, indicating a return to the *status quo ante*. This supports H1B. These results provide initial evidence of the post-pandemic resilience of the ECF ecosystem to the COVID-19 shock and the agility of digital platforms in adapting to increased demands for outside equity from smaller firms. The fact that ECF performance mean reverted to pre-Covid levels rather than worsen was unexpected. We conjecture that government support in the form of the Recovery Loan Scheme introduced in March 2021 may have helped some ECF firms to remain at normal (Pre-COVID-19) levels of business. Note that post-COVID-19 ECF performance contrasts with that of professional equity investment that enjoyed a boost during COVID-19, peaked in 2022Q1 before declining from 2022Q2 (Kacer & Wilson, 2023).[8] Summing up, the Table 5 regression results show that initial ECF campaigns exhibited an unexpected surge in funding performance during the full COVID-19 period relative to the pre-COVID-19 period which returned to pre-COVID-19 levels in the post-COVID-19 period.

The coefficients on *Ln(Goal)* are significantly positive at the 1% level in Models (1) to (4), indicating that Goal exerts a positive impact on both the Amount raised and the number of Funders. *Ln(Goal)* is excluded from Models (5) and (6) due to endogeneity concerns. The other two control variables that are mostly significant across models are EIS and Followers. The significantly positive coefficients of EIS in Models (1) to (6), but excluding (4), underline the direct impact of (tax relief for) professional investors on Amount raised, Funders and Overfunding. The control variable, Followers, is significantly positive at the 1% level in all regressions underlining the important impact of campaign visibility (Walthoff-Borm et al., 2018) and social capital (Vismara, 2019; Vu & Christian, 2023) on performance.

Overall, the results reported in Table 5 reveal a heightened interest in equity capital on ECF platforms, suggesting a surge in private equity demand during the crisis. This uptick coincides with the lockdown-induced constraints on traditional entrepreneurial finance sources like BA and VC (Mason & Botelho, 2021), and the scarcity of funding for small firms (Baltas et al., 2022; Cumming et al., 2021b; Zhang et al., 2015). They also underline the positive impact of COVID-19 on ventures' use of ECF as a viable source of equity finance (Cumming & Reardon, 2022; Vu & Christian, 2023).

Table 6 compares ECF campaign outcomes during the April 2020–March 2021 period, when both the BBLS and CBILS government LGS were available, versus the second year of COVID-19 when they were withdrawn. An LGS dummy variable (*LGS_d*) is employed to capture this effect. The coefficient of *LGS_d* is positive and highly significant across all regressions, indirectly suggesting a positive effect of the BBLS (and CBILS) government loan guarantee schemes, which backed most of SME debt finance

[8] We are grateful to an anonymous reviewer for this point.

Table 6 Loan guarantee scheme (LGS) vs. non LGS campaigns

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(Amount (£m))	Ln(Amount (£m))	Ln(Funders (k))	Ln(Funders (k))	Ln(Overfunding)	Ln(Overfunding)
LGS_d	0.0916	0.133**	0.206**	0.232***	0.151***	0.184***
	(1.62)	(2.29)	(2.52)	(2.86)	(2.67)	(3.10)
Ln(Goal (£m))	0.796***	0.784***	0.219***	0.184***		
	(16.75)	(14.73)	(3.46)	(2.84)		
Equity (%)	0.00423**	0.00390*	0.00105	−0.00029	0.000898	0.0008
	(2.32)	(1.71)	(0.41)	(−0.0837)	(0.54)	(0.36)
Pre-money Valuation (£m)	0.0036	0.0036	0.00380*	0.00314	0.00154	0.00163
	(1.53)	(1.38)	(1.66)	(1.31)	(0.78)	(0.76)
Team size	−0.00073	−0.0082	0.0449	0.022	−0.00651	−0.00129
	(−0.0254)	(−0.293)	(0.95)	(0.48)	(−0.201)	(−0.0391)
Firm stage	0.0422	0.0473	0.00346	0.0171	−0.0715*	−0.0631
	(0.85)	(0.91)	(0.06)	(0.31)	(−1.838)	(−1.580)
EIS	0.219***	0.212***	0.182**	0.164*	0.174***	0.145**
	(3.59)	(3.18)	(2.16)	(1.87)	(2.88)	(2.25)
Views (k)	−0.000426	−0.000208	0.00262	0.00322*	−0.00052	−0.000538
	(−0.597)	(−0.268)	(1.55)	(1.86)	(−0.804)	(−0.753)
Followers (k)	0.126**	0.114**	0.226**	0.198**	0.122***	0.115**
	(2.56)	(2.35)	(2.42)	(2.32)	(2.81)	(2.52)
Constant	−0.196	−0.249	5.764***	5.827***	0.357***	0.51
	(−1.233)	(−0.667)	(30.09)	(16.87)	(3.78)	(1.61)
Industry FE	No	Yes	No	Yes	No	Yes
Observations	207	207	207	207	207	207
Adjusted *R*-squared	0.85	0.852	0.617	0.652	0.257	0.265

The dependent variables in Models (1), (3) and (5) are the natural logarithms of Amount, Funders and Overfunding (Amount/Goal), respectively, where the key coefficient of interest is that of a Loan Guarantee Scheme dummy, LGS_d. The estimation method is ordinary least squares (OLS). Models (2), (4) and (6) represent the same models as (1), (3) and (5), respectively, but they include industry-fixed effects. The standard errors are robust. The dataset includes successful initial ECF campaigns for the full COVID-19 period (March 2020–Dec 2021). Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

during the first year of COVID-19 (Calabrese et al., 2022). The coefficient of 0.133 in Model (2) indicates that, during the government support period, campaigns raised 14.2% ($e^{0.133} - 1$) higher Amounts of funds than during the second year of COVID-19. Model (4) suggests that during the first year of COVID-19, the number of investors was 26.1% ($e^{0.232} - 1$) higher than that in the second year. Along similar lines, the Model (6) Overfunding coefficient implies a 20.2% ($e^{0.184} - 1$) increase in the Amount-to-goal ratio in the first relative to the second year of COVID-19. These results highlight the overall positive impact of the UK government's support of small firms during COVID-19 (Calabrese et al., 2022; Jibril et al., 2021) and support H2A.

Table 7 reports the results of the interaction of a COVID-19 period dummy with a seed dummy to examine the performance of seed versus more established firms during COVID-19.[9] The coefficients of *Covid_d* align with our previous regression results. The negative *Seed_d* coefficient is significant at the 5% level in (6), insignificant in (4) and significant at the 10% level only in (2). These indicate that seed firms generally underperform compared to more established firms which is in line with the typical information asymmetry problems of smaller firms (Coakley & Lazos, 2021; Wilson et al., 2018). In Model (2) with

[9] The robustness of the analysis is confirmed by examining both seed firms exclusively and in combination with early-stage firms to mitigate any influence the platform's definition of 'seed firms' might have on our findings.

Table 7 COVID-19 period and seed firm ECF outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(Amount (£m))	Ln(Amount (£m))	Ln(Funders (k))	Ln(Funders (k))	Ln(Overfunding)	Ln(Overfunding)
Covid_d	0.190*	0.0645	0.376***	0.229**	0.105**	0.0757
	(1.90)	(1.46)	(3.83)	(2.82)	(2.15)	(1.61)
Seed_d	−0.696***	−0.141*	−0.394***	−0.0923	−0.114**	−0.159**
	(−6.381)	(−1.849)	(−3.890)	(−0.708)	(−2.450)	(−1.984)
Covid_d × Seed_d	−0.144	0.139*	0.00624	0.179	0.162**	0.168**
	(−0.873)	(1.85)	(0.04)	(1.41)	(1.99)	(2.10)
Ln (Goal (£m))		0.847***		0.195***		
		(31.31)		(4.82)		
Equity (%)		0.00354**		−0.00113		0.00157
		(2.25)		(−0.680)		(1.08)
Pre-money Valuation (£m)		0.000819		−0.00109		−0.000393
		(0.66)		(−0.929)		(−0.406)
Team size		−0.00489		0.00721		−0.0098
		(−0.208)		(0.18)		(−0.390)
Firm stage		0.016		0.0635		−0.06
		(0.33)		(0.84)		(−1.270)
EIS tax		0.0866**		0.0832		0.0653*
		(2.19)		(1.41)		(1.66)
Views (k)		0.000626		0.00581***		0.000341
		(0.77)		(4.29)		(0.47)
Followers (k)		0.102***		0.197***		0.101***
		(4.13)		(5.86)		(4.68)
Constant	−0.551***	0.155	6.020***	5.590***	0.475***	0.611***
	(−9.830)	(0.81)	(113.10)	(20.63)	(18.78)	(3.14)
Industry FE	No	Yes	No	Yes	No	Yes
Observations	538	487	538	487	538	487
Adjusted *R*-squared	0.122	0.853	0.064	0.643	0.03	0.236

This table presents the OLS regression results with robust standard errors of the interaction of Seed_d and Covid_d. Covid_d × Seed_d is the main variable of interest. The dependent variables in models (1), (3) and (5) are the natural logarithms of Amount, Funders and Overfunding (Amount/Goal), respectively. Models (2), (4) and (6) add control variables and industry-fixed effects to previous models. The dataset includes successful initial ECF campaigns on Crowdcube from January 2018 to October 2023. Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Ln(Amount (£m)) as the dependent variable, the interaction term coefficient is positive but significant at the 10% level only, while it is insignificant in (4). However, it is statistically significant at the 5% level in Model (6), suggesting that seed firms enjoy an 18.2% ($e^{0.168} - 1$) increase in Overfunding relative to early-stage and growth firms during COVID-19. Overall, COVID-19 had a positive effect on Overfunding, and, at a lower significance level, the Amount raised by seed firms in comparison to their more established counterparts. These results lend some support to H2B.

The findings in Tables 5, 6 and 7 are consistent with BA and VC funds leveraging the due diligence of ECF platforms and of the lead investor in campaigns to invest in seed startups. ECF platforms enable them to gain a direct equity stake in seed firms rather than an indirect one via convertible loan notes that they traditionally employed. The findings are also consistent with an element of the 'spray and pray' approach of VC funds diversifying their approach to seed firms with smaller investments and limited involvement in governance (compared to their traditional approach)

across more startups over the past decade or so in the USA (Ewens et al., 2018). Moreover, these funds were attracted by digital ECF platform governance and, where relevant, the quality signal of LGS loans to invest in seed firms. They are in line with the findings of Jibril et al. (2021) on the positive impact of the policy instruments used by the UK government to support SMEs (Calabrese et al., 2022; Cowling et al., 2023; Wilson et al., 2023). Here, the prospect of using ECF campaigns for debt and capital gearing ratio reduction likely led to additional successful campaigns during COVID-19. Indeed, this observation aligns with the finding that ECF platforms emerged as the most active investors in early-stage equity in the UK in 2020 (Beauhurst, 2022; Cerpentier et al., 2022).

5 Robustness tests

This section discusses the results of robustness tests. First, Table 10 in the Appendix presents the robustness test results for H1A and H1B. The *Covid_d* coefficient compares the performance of COVID-19 period campaigns versus non- (pre- and post-) COVID-19 campaigns. These results reconfirm that ventures attract significantly larger Amounts of capital, more Funders and higher Overfunding ratios during the COVID-19 than the non-COVID-19 periods.

Table 11 in the Appendix presents the results of comparing the first year of COVID-19 with all other periods. The coefficient of the government *LGS_d* is positive and significant in the models, reconfirming the H2A hypothesis.

Table 12 in the Appendix presents the results of utilising propensity score matching to compare the performance of seed firms during the COVID-19 period with those in the other periods. For robustness purposes, this analysis is conducted using two routines in Stata—*psmatch2* (Panel A) and *teffects* (Panel B)—which utilize different approaches for calculating standard errors. The Average Treatment Effect on Treated (ATET), capturing the causal impact of COVID-19 on seed performance, is reported using one, three and five matches per observation. The significantly positive coefficients across all three measures of performance suggest that, during COVID-19, seed firms outperformed their counterparts in non-COVID-periods. These findings are consistent with those in Table 7, demonstrating that during the COVID-19 period, seed firms' access to ECF was unrestricted and they significantly outperformed.

6 Conclusions

This paper provides clear evidence of an unexpected surge in ECF performance during the COVID-19 period relative to that of the pre-COVID-19 period. One explanation for this is the ECF platform evolution towards attracting high-quality firms, a task at which it was less successful during its early years (Blaseg et al., 2021; Walthoff-Borm et al., 2018). The pandemic's constraints inadvertently tipped the scales in favour of digital equity platforms, eclipsing traditional avenues such as BA and VC. This pivot is compounded by a broader, seismic shift from public to private equity, reshaping the investment landscape over recent decades.

These unexpected findings in this context are in step with the burgeoning and positive impact of digitalization on entrepreneurial finance which has created new financial avenues that complement traditional intermediaries as discussed by Vismara (2022). Digitalisation serves a dual purpose. First, it empowers nascent firms, even those with limited financial track records and no audited accounts, to secure financial resources through internet platforms (Butticè & Vismara, 2022; Inceoglu et al., 2024). This corroborates the democratizing influence of ECF (Cumming et al., 2021a; Fisch et al., 2022) and its leading role during the COVID-19 period (Cumming et al., 2021b). The latter period offered a unique laboratory setting for testing the performance of ECF at a time of heightened uncertainty and limited access for smaller firms to traditional entrepreneurial finance sources due to lockdown restrictions (Baltas et al., 2022; Cumming et al., 2021b; Zhang et al., 2015).

Second, the disruption brought by the pandemic, unlike that of natural disasters, precipitated a shift in due diligence practices as digital funding became a necessity (Cumming et al., 2021a). This situation, marked by intensified information asymmetries, favoured digital channels like ECF and marketplace (P2P) and other fintech lending. Consequently, ECF

platforms thrived by catering to high-calibre small private firms that met exacting due diligence standards. ECF thus emerged as a lifeline for these ventures, ensuring their survival and prosperity. For traditional and professional investors, the pandemic served as an impromptu nudge for transitioning to online services offered by digital platforms. This paves the way for future research on the post-pandemic online investment tactics of BAs and VCs who have unintentionally test-driven the value added by ECF platforms during the COVID-19 pandemic.

This paper reveals an unforeseen positive consequence of government loan guarantee schemes (LGS), notably the Bounce Back Loan Scheme with 80% repayment guarantees, on equity sources for small firms. Contrary to initial concerns about potential negative effects on SME loans and other finance sources,[10] the findings highlight the beneficial impact on small firms' access to equity capital—an outcome not anticipated at the scheme's inception. The paper underlines the pivotal role of LGS during the initial year of the COVID-19 crisis. By providing typical repayment guarantees of 80%, these schemes not only offered vital liquidity support for equity crowdfunding (ECF) campaigns by recipient firms but significantly bolstered the performance of seed firms. This outperformance among young seed firms stands out as particularly surprising, given that traditional investors typically favour more established firms, a preference intensified by the financial crisis (Vismara, 2018). The resilience and adaptability of ECF platforms during COVID-19 further underscore their critical role in mitigating the impacts of external disruptions. This dual effect of LGS and ECF platforms in facilitating small firms' access to equity capital highlights their importance, offering policymakers evidence of the effectiveness of LGS, particularly in supporting seed firms.

This paper provides a complementary perspective to that of Savio et al. (2024) who analyse government financial support mechanisms in Italy from 2008 to 2014, specifically examining temporary debt suspension. Our study focuses on loan guarantees. While both debt moratoria and loan guarantees are forms of financial support, they influence firm strategies in a distinct manner. Savio et al. (2024) discuss how debt moratoria—pausing debt payments—can bolster SME long-term growth. Conversely, loan guarantees acted as a short-term buffer against the COVID-19 crisis by providing much-needed working capital and liquidity and potentially supporting related ECF funding via a liquidity signal during the pandemic. While Savio et al. (2024) investigate principal-principal conflicts within a large SME sample, our study suggests that such conflicts are less prevalent in digital ECF funding, given the equitable share ownership and exit rights ensured by digital nominee shareholding (Coakley et al., 2024).

This study has some limitations. For example, the dataset is confined to just one of the two major UK ECF platforms—the Crowdcube platform. However, this is the longest established and largest UK platform which vouches for the broad applicability of our findings. Moreover, although more than 90% of SMEs utilized the government guarantee schemes for raising debt during the first year of the pandemic (Calabrese et al., 2022), the UK government's policy of withholding the identities of state-backed COVID-19 loan recipients[11] restricts directly linking our ECF dataset with that for the COVID-19 loans. Nonetheless, the huge numbers of firms that availed of LGS schemes and the related increase in their capital gearing ratios make it plausible that many such firms sought outside equity from ECF platforms and/or VC and BA investors to recapitalize.

The findings suggest two areas for future research. First, the empirical results are consistent with ECF as funding of first resort for small private firms during a crisis period. The question is whether this is driven by the COVID-19 crisis effect or whether it is a more general phenomenon for young, high-quality private firms with growth aspirations. Second, it would be interesting to explore the relative performance during the COVID-19 period of ventures that received a combination of ECF, and other digital funding (e.g. market invoice finance) compared to ventures that received ECF funding only. However, this currently would face data challenges.

[10] Please refer to https://assets.publishing.service.gov.uk/media/5ee11ef3d3bf7f1eb4a1b4eb/200501_AO_Direction_letter_on_Bounce_Back_Loans_Scheme.pdf

[11] https://www.theguardian.com/business/2023/jan/05/names-of-uk-covid-business-loan-applicants-to-stay-secret-tribunal-rules

Appendix

Table 8 List of variables

Dependent variables	
Amount (£m)	Total Amount raised in the campaign
Funders (k)	The number of funders (investors) at the end of the campaign
Overfunding	Amount raised divided by goal
Explanatory variables	
COVIDcat	A categorical variable that takes 1 for campaigns pre-COVID-19, 2 during COVID-19 and 3 post-COVID-19
COVID_Pre	A dummy variable that takes 1 for the COVID-19 period and zero for pre-COVID-19
Post_Pre	A dummy variable that takes 1 for the post-COVID-19 period and zero for pre-COVID-19
Covid_d	A dummy variable that takes 1 for the COVID-19 period and zero otherwise
LGS _d	A dummy variable that takes 1 for the period BBLS/CBILS was offered (April 2020–March 2021) by the UK government and 0 otherwise
Seed_d	A dummy variable that takes 1 for seed firms and zero for early-stage and growth firms
Other variables	
Ln(Goal (£m))	The natural logarithm of funding Goal that firms set at the beginning of a campaign
Equity (%)	Equity (%) of firm's equity issued during the campaign
Pre-money Valuation (£m)	Firm valuation (£m) before the crowdfunding campaign
Team size	The number of founders
Firm stage	A categorical variable that takes 1 for seed-, 2 for early- and 3 for growth-stage
EIS	A dummy that takes 1 if firms use the Enterprise Investment Scheme tax relief and zero otherwise
Views (k)	Number of viewers of the firm on the Crowdcube platform
Followers (k)	Number of followers of the firm on the Crowdcube platform

Table 9 Correlation matrix

Variables													
Amount (£m)	1												
Funders (k)	0.780*	1											
Overfunding	0.467*	0.511*	1										
COVIDcat	0.123*	0.063	−0.012	1									
LGS_d	−0.015	0.046	0.182*	0.04	1								
Goal (£m)	0.754*	0.372*	−0.026	0.153*	−0.097*	1							
Equity (%)	0.03	−0.052	0.048	−0.118*	0.144*	0.061	1						
Pre-money Valuation (£m)	0.594*	0.655*	0.215*	0.176*	−0.05	0.436*	−0.243*	1					
Team size	0.024	0.059	0.046	0.028	0.007	0.003	0.136*	−0.014	1				
Firm stage	0.429*	0.298*	0.041	0.057	−0.104*	0.444*	−0.073*	0.380*	−0.077*	1			
EIS	−0.126*	−0.084*	−0.003	0.054	−0.055	−0.106*	−0.068	−0.199*	0.07	−0.073*	1		
Followers (k)	0.700*	0.933*	0.461*	−0.025	0.053	0.315*	−0.012	0.570*	0.082*	0.216*	−0.074	1	
Views (k)	0.540*	0.686*	0.245*	−0.064	0.106*	0.374*	0.077*	0.532*	0	0.302*	−0.157*	0.586*	1

This table presents the correlation matrix detailing the relationships among all variables utilized in this study. Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Table 10 COVID-19 vs. non-COVID-19 period campaigns (Robustness H1A and H1B)

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(Amount (£m))	Ln(Amount (£m))	Ln(Funders (k))	Ln(Funders (k))	Ln(Overfund)	Ln(Overfund)
Covid_d	0.107***	0.101***	0.276***	0.283***	0.121***	0.120***
	(3.10)	(2.80)	(5.35)	(5.79)	(3.34)	(3.28)
Ln (Goal (£m))	0.848***	0.844***	0.221***	0.191***		
	(31.37)	(31.18)	(5.44)	(5.23)		
Equity (%)	0.00349**	0.00356**	−0.000147	−0.00103	0.00147	0.00161
	(2.51)	(2.30)	(−0.0517)	(−0.355)	(1.14)	(1.13)
Pre-money Valuation (£m)	0.000658	0.00081	−0.000903	−0.000937	−0.000638	−0.000356
	(0.54)	(0.66)	(−0.501)	(−0.555)	(−0.681)	(−0.376)
Founding team size	−0.00826	−0.00455	0.000974	0.00694	−0.0158	−0.00801
	(−0.361)	(−0.197)	(0.03)	(0.22)	(−0.658)	(−0.340)
Firm stage	0.0537*	0.0563*	0.0626	0.0639	−0.0215	−0.0185
	(1.86)	(1.90)	(1.48)	(1.64)	(−0.838)	(−0.717)
EIS tax relief	0.0995***	0.0957**	0.125**	0.0908	0.0816**	0.0789**
	(2.59)	(2.46)	(2.25)	(1.64)	(2.11)	(2.13)
Number of views (k)	0.00046	0.000526	0.00555**	0.00570***	0.000225	0.00035
	(0.55)	(0.65)	(2.42)	(2.66)	(0.30)	(0.48)
Number of followers (k)	0.110***	0.102***	0.213***	0.196***	0.107***	0.0899***
	(4.15)	(4.15)	(3.45)	(3.58)	(4.75)	(4.15)
Constant	−0.0786	0.00734	5.588***	5.526***	0.316***	0.458***
	(−0.794)	(−0.046)	(−36.41)	(−29.98)	(−4.628)	(−2.924)
Industry FE	No	Yes	No	Yes	No	Yes
Observations	487	487	487	487	487	487
Adjusted *R*-squared	0.85	0.852	0.597	0.643	0.224	0.224

The dependent variables in models (1), (3) and (5) are the natural logarithms of Amount(£m), Funders and Overfunding (Amount/Goal), respectively, with the key coefficient of interest being Covid_d. The estimation method used is ordinary least squares (OLS). Models (2), (4) and (6) are the same as (1), (3) and (5), respectively, but include industry-fixed effects. The standard errors are robust. The dataset includes successful initial campaigns on Crowdcube from January 2018 to October 2023. Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Table 11 Loan guarantee scheme (LGS) vs. non LGS campaigns (Robustness H2A)

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(Amount (£m))	Ln(Amount (£m))	Ln(Funders (k))	Ln(Funders (k))	Ln(Overfunding)	Ln(Overfunding)
LGS_d	0.134***	0.127***	0.310***	0.309***	0.170***	0.165***
	(2.94)	(2.67)	(5.66)	(5.51)	(3.62)	(3.35)
Ln (Goal (£m))	0.855***	0.849***	0.235***	0.201***		
	(31.46)	(31.33)	(5.61)	(5.35)		
Equity (%)	0.00315**	0.00327**	−0.000864	−0.00165	0.00112	0.00124
	(2.22)	(2.06)	(−0.306)	(−0.568)	(0.85)	(0.85)
Pre-money Valuation (£m)	0.000717	0.000884	−0.000785	−0.000775	−0.000475	−0.000253
	(0.58)	(0.71)	(−0.444)	(−0.470)	(−0.502)	(−0.259)
Team size	−0.00522	−0.00214	0.00874	0.0134	−0.0119	−0.00641
	(−0.228)	(−0.0938)	(0.24)	(0.42)	(−0.496)	(−0.263)
Firm stage	0.047	0.0501*	0.045	0.0465	−0.0245	−0.0239
	(1.64)	(1.70)	(1.09)	(1.20)	(−0.958)	(−0.919)
EIS	0.0998***	0.0970**	0.125**	0.0937*	0.0835**	0.0780**
	(2.63)	(2.52)	(2.26)	(1.70)	(2.19)	(2.02)
Views (k)	0.000376	0.000454	0.00539**	0.00558***	0.000109	0.00012
	(0.45)	(0.57)	(2.36)	(2.63)	(0.15)	(0.17)
Followers (k)	0.111***	0.102***	0.216***	0.199***	0.108***	0.101***
	(4.22)	(4.23)	(3.52)	(3.67)	(4.86)	(4.83)
Constant	−0.0424	0.0175	5.683***	5.558***	0.332***	0.451***
	(−0.431)	(0.11)	(36.91)	(30.28)	(4.90)	(2.87)
Industry FE	No	Yes	No	Yes	No	Yes
Observations	487	487	487	487	487	487
Adjusted *R*-squared	0.851	0.852	0.594	0.639	0.231	0.236

The dependent variables in models (1), (3) and (5) are the natural logarithms of Amount (£m), Funders (k) and Overfunding (Amount/goal), respectively, with the key coefficient of interest being LGS_d. The estimation method used for these three models was ordinary least squares (OLS). Models (2), (4) and (6) represent the same models as (1), (3) and (5), respectively, but with the inclusion of industry-fixed effects. The standard errors are robust. The dataset includes successful initial ECF campaigns on Crowdcube from January 2018 to October 2023. Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Table 12 Propensity Score Matching (Robustness H2B)

Panel A: Results using *psmatch2* routine in Stata			
	(1)	(2)	(3)
	Ln(Amount)	Ln(Funders)	Ln(Overfunding)
ATET (One match per observation)	0.04	0.27*	0.17*
	(0.24)	(1.66)	(1.86)
ATET (Three matches per observation)	0.09	0.39***	0.194***
	(0.61)	(3.02)	(2.59)
ATET (Five matches per observation)	0.15	0.38***	0.209***
	(1.09)	(3.01)	(2.92)
Obs	149	149	149
Panel B: Results using *teffects* routine in Stata			
	Ln(Amount)	Ln(Funders)	Ln(Overfunding)
ATET (One match per observation)	0.348***	0.647**	0.243*
	(7.27)	(2.55)	(1.88)
ATET (Three matches per observation)	0.389**	0.525***	0.227**
	(2.46)	(3.62)	(2.26)
ATET (Five matches per observation)	0.423***	0.535***	0.232***
	(2.91)	(4.54)	(2.66)
Obs	143	143	143

This table reports the Average Treatment Effect on Treated (ATET) and the *t*-statistics in parentheses using two routines in Stata. Seed firms during COVID-19 are matched with one, three and five counterfactuals based on their propensity scores. The treatment and control groups are matched based on the Goal (£m), Equity (%), Pre-money Valuation (£m) and Team Size

Table 13 ECF post-COVID-19 vs. COVID-19 outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(Amount (£m))	Ln(Amount (£m))	Ln(Funders (k))	Ln(Funders (k))	Ln(Overfunding)	Ln(Overfunding)
Post_COVID	−0.0771*	−0.0842*	−0.281***	−0.314***	−0.126***	−0.134***
	(−1.861)	(−1.946)	(−3.842)	(−4.747)	(−3.055)	(−3.109)
Ln (Goal (£m))	0.839***	0.842***	0.215***	0.210***		
	(23.44)	(21.68)	(3.89)	(4.17)		
Equity (%)	0.00308**	0.00290*	0.000341	−0.000832	0.00114	0.00104
	(2.33)	(1.92)	(0.12)	(−0.277)	(0.91)	(0.72)
Pre-money Valuation (£m)	0.000476	0.000761	0.0000371	0.000212	−0.000459	−0.0000795
	(0.36)	(0.56)	(0.02)	(0.12)	(−0.430)	(−0.0709)
Team size	−0.0146	−0.0123	−0.000994	0.00408	−0.0219	−0.0151
	(−0.616)	(−0.514)	(−0.0248)	(0.11)	(−0.850)	(−0.570)
Firm stage	0.0601	0.0527	0.0394	0.0239	−0.0272	−0.0323
	(1.59)	(1.32)	(0.70)	(0.48)	(−0.859)	(−0.999)
EIS tax relief	0.154***	0.149***	0.143*	0.106	0.132***	0.121***
	(3.44)	(3.16)	(1.96)	(1.45)	(2.95)	(2.61)
Views (k)	0.000716	0.00075	0.00528**	0.00528**	0.000433	0.000419
	(0.76)	(0.86)	(2.14)	(2.38)	(0.51)	(0.54)
Followers (k)	0.108***	0.0994***	0.199***	0.180***	0.107***	0.0985***
	(3.72)	(3.81)	(3.14)	(3.34)	(4.09)	(4.15)
Constant	−0.0221	0.0724	5.900***	6.143***	0.416***	0.564***
	(−0.171)	(0.33)	(31.02)	(23.00)	(5.22)	(2.88)
Industry FE	No	Yes	No	Yes	No	Yes
Observations	352	352	352	352	352	352
Adjusted *R*-squared	0.841	0.844	0.56	0.622	0.266	0.283

The dependent variables in Models (1), (3) and (5), are the natural logarithm of Amount (£m), Funders (k) and Overfunding, respectively, with the key coefficient of interest being that on Post_COVID. This is a dummy that takes 1 for the post-COVID-19 period and zero for the COVID-19 period. The estimation method is ordinary least squares (OLS). Models (2), (4) and (6) are the same as models (1), (3) and (5), respectively, but add industry fixed effects. The standard errors are robust. The dataset includes successful initial ECF campaigns for COVID-19 (March 2020–Dec 2021) and post-COVID-19 (Dec 2021–Oct 2023) periods. Significance at the 10%, 5% and 1% levels is indicated by *, ** and ***, respectively

Table 14 PSM post-estimation tests

Variable	Unmatched matched	Mean treated	Mean control	%bias	%bias reduction	*t*	*P*>|*t*|	*V*(*T*)/ *V*(*C*)
Goal (m)	U	0.22179	0.2735	−21.3		−1.3	0.196	0.75
	M	0.19889	0.20563	−2.8	87	−0.22	0.83	0.75
Equity (%)	U	13.322	12 .212	11.8		0.7	0.484	3.56*
	M	12.305	12 .54	−2.1	82.1	−0.19	0.847	1.14
Pre-money Valuation (£m)	U	3.7744	3.5233	4.3		0.26	0.798	3.81*
	M	2.9955	2.8172	3.1	29	0.4	0.688	0.87
Team size	U	1.4321	1.3824	6		0.36	0.717	1.41
	M	1.4487	1.4197	3.5	41.6	0.22	0.827	1.5
Sample	Ps R2	LR χ^2	p>χ^2	Mean bias	Median bias	*B*	*R*	%Var
Unmatched	0.031	6.42	0.17	1.9	8.9	39.5*	1.78	50
Matched	0.4	0.77	0.942	2.9	2.9	14	1.16	0

This table reports the *t*-statistics and *p*-value for the difference in mean between the treated and control groups before and after matching. The bias percentage is reported to examine covariate imbalance before and after matching

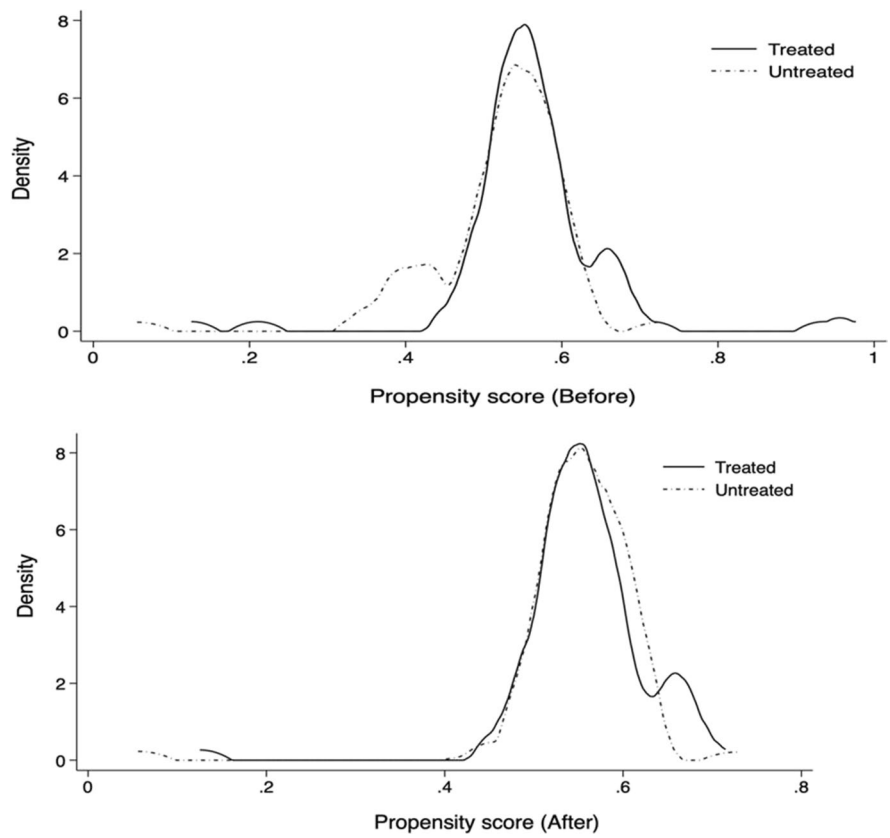

Fig. 2 Propensity score of treated and untreated firms before and after matching. The figure on the left shows the propensity score of Treated (seed firms during COVID-19) versus Untreated (seed firms in the non-COVID-19 period) before matching, whereas the figure on the right shows it after matching. The propensity score refers to the probability of a firm being in the Treated (seed firms during COVID-19) or Untreated (seed firms in the non-COVID-19 period) group given the covariates calculated based on Goal (£m), Equity (%), Pre-money Valuation (£m) and Team Size

Acknowledgements An earlier version of this paper was presented at the 2nd International Fintech Conference in Cardiff in November 2023. We are grateful to the participants for their helpful comments. We also wish to thank two anonymous reviewers whose insightful comments and helpful suggestions helped substantially to improve the exposition and overall quality of this paper. Finally, we thank the Editor Prof. Paul Momtaz for giving us the opportunity to revise our paper.

Funding Open access funding provided by Università degli studi di Bergamo within the CRUI-CARE Agreement.

References

Ahlers, G. K., Cumming, D., Günther, C., & Schweizer, D. (2015). Signaling in equity crowdfunding. *Entrepreneurship Theory and Practice, 39*, 955–980. https://doi.org/10.1111/etap.12157

Altig, D., Baker, S., Barrero, J. M., Bloom, N., Bunn, P., Chen, S., Davis, S. J., Leather, J., Meyer, B., & Mihaylov, E. (2020). Economic uncertainty before and during the COVID-19 pandemic. *Journal of Public Economics, 191*, 104274. https://doi.org/10.1016/j.jpubeco.2020.104274

Baker, S. R., Bloom, N., Davis, S. J., & Terry, S. J. (2020). *Covid-induced economic uncertainty*. National Bureau of Economic Research.

Bali, T. G., Cakici, N., & Whitelaw, R. F. (2011). Maxing out: Stocks as lotteries and the cross-section of expected returns. *Journal of Financial Economics, 99*, 427–446. https://doi.org/10.1016/j.jfineco.2010.08.014

Baltas, K., Fiordelisi, F., & Mare, D. S. (2022). Alternative finance after natural disasters. *British Journal of Management, 33*, 117–137. https://doi.org/10.1111/1467-8551.12516

Beauhurst. (2022). *The state of UK equity crowdfunding in 2022*. Available at: https://www.beauhurst.com/blog/uk-equitycrowdfunding/

Belitski, M., C. Guenther, A. S. Kritikos and R. Thurik (2022). 'Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses', *Small Business Economics*, pp. 1–17 https://doi.org/10.1007/s11187-021-00544-y

Blaseg, D., Cumming, D., & Koetter, M. (2021). Equity crowdfunding: High-quality or low-quality entrepreneurs? *Entrepreneurship Theory and Practice, 45*, 505–530. https://doi.org/10.1177/10422587198994

Block, J. H., Colombo, M. G., Cumming, D. J., & Vismara, S. (2018). New players in entrepreneurial finance and why they are there. *Small Business Economics, 50*, 239–250. https://doi.org/10.1007/s11187-016-9826-6

Block, J., Fisch, C., Vismara, S., & Andres, R. (2019). Private equity investment criteria: An experimental conjoint analysis of venture capital, business angels, and family offices. *Journal of Corporate Finance, 58*, 329–352. https://doi.org/10.1016/j.jcorpfin.2019.05.009

Block, J. H., Groh, A., Hornuf, L., Vanacker, T., & Vismara, S. (2021). The entrepreneurial finance markets of the future: A comparison of crowdfunding and initial coin offerings. *Small Business Economics, 57*, 865–882. https://doi.org/10.1007/s11187-020-00330-2

Brown, R., & Cowling, M. (2021). The geographical impact of the Covid-19 crisis on precautionary savings, firm survival and jobs: Evidence from the United Kingdom's 100 largest towns and cities. *International Small Business Journal, 39*, 319–329. https://doi.org/10.1177/0266242621989326

Brown, R., & Rocha, A. (2020). Entrepreneurial uncertainty during the Covid-19 crisis: Mapping the temporal dynamics of entrepreneurial finance. *Journal of Business Venturing Insights, 14*, e00174. https://doi.org/10.1016/j.jbvi.2020.e00174

Brown, R., Rocha, A., & Cowling, M. (2020). Financing entrepreneurship in times of crisis: Exploring the impact of COVID-19 on the market for entrepreneurial finance in the United Kingdom. *International Small Business Journal, 38*, 380–390. https://doi.org/10.1177/0266242620937464

Butticè, V., & Vismara, S. (2022). Inclusive digital finance: The industry of equity crowdfunding. *Journal of Technology Transfer, 47*, 1224–1241. https://doi.org/10.1007/s10961-021-09875-0

Calabrese, R., Cowling, M., & Liu, W. (2022). Understanding the dynamics of UK Covid-19 SME financing. *British Journal of Management, 33*, 657–677. https://doi.org/10.1111/1467-8551.12576

Cerpentier, M., Vanacker, T., Paeleman, I., & Bringmann, K. (2022). Equity crowdfunding, market timing, and firm capital structure. *The Journal of Technology Transfer, 47*, 1766–1793. https://doi.org/10.1007/s10961-021-09893-y

Chandler, J. A., Short, J. C., & Wolfe, M. T. (2021). Finding the crowd after exogenous shocks: Exploring the future of crowdfunding. *Journal of Business Venturing Insights, 15*, e00245. https://doi.org/10.1016/j.jbvi.2021.e00245

Coakley, J., & Lazos, A. (2021). New developments in equity crowdfunding: A review. *Review of Corporate Finance, 1*, 341–405. https://doi.org/10.1561/114.00000008

Coakley, J., Lazos, A., & Liñares-Zegarra, J. M. (2022a). Seasoned equity crowdfunded offerings. *Journal of Corporate Finance, 77*, 101880. https://doi.org/10.1016/j.jcorpfin.2020.101880

Coakley, J., Lazos, A., & Liñares-Zegarra, J. M. (2022b). Equity crowdfunding founder teams: Campaign success and venture failure. *British Journal of Management, 33*, 286–305. https://doi.org/10.1111/1467-8551.12494

Coakley, J., D. J. Cumming, A. Lazos and S. Vismara (2024). 'Syndicated equity crowdfunding and the collective action problem', *Available at SSRN 4703001,* https://doi.org/10.2139/ssrn.4703001

Cong, L. W., & Xiao, Y. (2024). Information cascades and threshold implementation: Theory and an application to crowdfunding. *Journal of Finance, 79*(1), 579–629.

Cortés, K. R., & Strahan, P. E. (2017). Tracing out capital flows: How financially integrated banks respond to natural disasters. *Journal of Financial Economics, 125*, 182–199. https://doi.org/10.1016/j.jfineco.2017.04.011

Cowling, M., Brown, R., & Lee, N. (2021). The geography of business angel investments in the UK: Does local bias (still) matter? *Environment and Planning a: Economy and Space, 53*(5), 1180–1200.

Cowling, M., Wilson, N., Nightingale, P., & Kacer, M. (2022). Predicting future default on the Covid-19 bounce back loan scheme: The£ 46.5 billion question. *International Small Business Journal, 40*, 650–666. https://doi.org/10.1177/02662426211058050

Cowling, M., P. Nightingale and N. Wilson (2023). 'COVID-19 lending support and regional levelling up: Evidence from UK loan guarantee schemes', *Regional Studies***,** pp. 1–16 https://doi.org/10.1080/00343404.2022.2159021

Cumming, D., Meoli, M., & Vismara, S. (2021a). Does equity crowdfunding democratize entrepreneurial finance? *Small Business Economics, 56*, 533–552. https://doi.org/10.1007/s11187-019-00188-z

Cumming, D. and R. S. Reardon (2022). 'COVID-19 and entrepreneurial processes in US equity crowdfunding', *Journal of Small Business Management***,** pp. 1–24 https://doi.org/10.1080/00472778.2022.2051178

Cumming, D. J., A. Martinez-Salgueiro, R. S. Reardon and A. Sewaid (2021b). 'COVID-19 bust, policy response, and rebound: Equity crowdfunding and P2P versus banks', *The Journal of Technology Transfer***,** pp. 1–22 https://doi.org/10.1007/s10961-021-09899-6

Estrin, S., Gozman, D., & Khavul, S. (2018). The evolution and adoption of equity crowdfunding: Entrepreneur and investor entry into a new market. *Small Business Economics, 51*, 425–439. https://doi.org/10.1007/s11187-018-0009-50

Ewens, M., & Farre-Mensa, J. (2022). "Private or public equity? The Evolving Entrepreneurial Finance Landscape." *Annual Review of Financial Economics, 14*, 271–293. https://doi.org/10.1146/annurev-financial-101821-121115

Ewens, M., Nanda, R., & Rhodes-Kropf, M. (2018). Cost of experimentation and the evolution of venture capital. *Journal of Financial Economics, 128*, 422–442.

Feyen, E., Gispert, T. A., Kliatskova, T., & Mare, D. S. (2020). *Taking stock of the financial sector policy response to COVID-19 around the world*. World Bank Group, Finance, Competitiveness, and Innovation Global Practice. Available at: https://openknowledge.worldbank.org/server/api/core/bitstreams/34d67981-ec9f-5310-bd93-5cabf2ae3966/content

Fisch, C., & Momtaz, P. P. (2020). Institutional investors and post-ICO performance: An empirical analysis of investor returns in initial coin offerings (ICOs). *Journal of Corporate Finance, 64*, 101679.

Fisch, C., Meoli, M., & Vismara, S. (2022). Does blockchain technology democratize entrepreneurial finance? An empirical comparison of ICOs, venture capital, and REITs. *Economics of Innovation and New Technology, 31*(1–2), 70–89. https://doi.org/10.1080/10438599.2020.1843991

Fulghieri, P., Garcia, D., & Hackbarth, D. (2020). Asymmetric information and the pecking (dis) order. *Review of Finance, 24*, 961–996. https://doi.org/10.1093/rof/rfaa005

Guenther, C., Johan, S., & Schweizer, D. (2018). Is the crowd sensitive to distance?—How investment decisions differ by investor type. *Small Business Economics, 50*, 289–305. https://doi.org/10.1007/s11187-016-9834-6

Inceoglu, I., Vanacker, T., & Vismara, S. (2024). Digitalization and resource mobilization. *British Journal of Management*. https://doi.org/10.1111/1467-8551.12817

Jibril, H., Roper, S., & Hart, M. (2021). Covid-19, business support and SME productivity in the UK. *ERC Research Paper* (p. 94). Available at: https://www.productivity.ac.uk/wp-content/uploads/2021/06/COVID19-business-support-and-SME-productivity-inthe-UK-FINAL.pdf

Kacer, M. and N. Wilson (2023). 'Supporting innovative start-up and growing businesses: Equity finance provision through the pandemic: Interim report', *Available at SSRN 4456252,* https://doi.org/10.2139/ssrn.4456252

Kleinert, S., Volkmann, C., & Grünhagen, M. (2020). Third-party signals in equity crowdfunding: The role of prior financing. *Small Business Economics, 54*, 341–365. https://doi.org/10.1007/s11187-018-0125-2

Kleinert, S., Bafera, J., Urbig, D., & Volkmann, C. K. (2022). Access denied: How equity crowdfunding platforms use quality signals to select new ventures. *Entrepreneurship Theory and Practice, 46*, 1626–1657. https://doi.org/10.1177/10422587211011945

Lattanzio, G., W. L. Megginson and A. Sanati (2023). 'Dissecting the listing gap: Mergers, private equity, or regulation?', *Journal of Financial Markets***,** p. 100836 https://doi.org/10.1016/j.finmar.2023.100836

Li, T., Trinh, V. Q., & Elnahass, M. (2023). Drivers of global banking stability in times of crisis: The role of corporate social responsibility. *British Journal of Management, 34*, 595–622. https://doi.org/10.1111/1467-8551.12631

Mason, C., & Botelho, T. (2021). Business angel investing during the covid-19 economic crisis: Evidence from Scotland. *Venture Capital, 23*, 321–343. https://doi.org/10.1080/13691066.2021.2019564

Meoli, M., & Vismara, S. (2021). Information manipulation in equity crowdfunding markets. *Journal of Corporate Finance, 67*, 101866. https://doi.org/10.1016/j.jcorpfin.2020.101866

Momtaz, P. P. (2023). "The economics of PIPEs", revisited. *Small Business Economics, 60*(1), 59–83.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*, 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

Nguyen, L., & Wilson, J. O. (2020). 'How does credit supply react to a natural disaster? *Evidence from the Indian Ocean Tsunami', the European Journal of Finance,*

26, 802–819. https://doi.org/10.1080/1351847X.2018.1562952

OECD. (2020). *Coronavirus (COVID-19): SME policy responses*. Available at: https://www.oecd.org/en/publications/2020/07/coronavirus-covid-19-sme-policyresponses_c7ff14a3.html#:~:text=It%20examines%20how%20SMEs%20are,responses%20to%20foster%20SME%20resilience

Paterson, A., Sakariyahu, R., Lawal, R., & Alabi, A. (2024). The impact of government policy responses to the COVID-19 pandemic and Brexit on the UK financial market: A behavioural perspective. *British Journal of Management, 35*, 174–191. https://doi.org/10.1111/1467-8551.12702

Ritter, J., Signori, A., & Vismara, S. (2013). 'Economies of scope and IPO volume in Europe', In "Handbook of Research on IPOs",pag. 11–34, ed. Levis, M., & Vismara, S. (eds), 2013, Edward Elgar, Cheltenham, UK, ISBN: 978 1 78195 536 9.

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. *British Journal of Management*. https://doi.org/10.1111/1467-8551.12795

Vismara, S. (2016). Equity retention and social network theory in equity crowdfunding. *Small Business Economics, 46*, 579–590. https://doi.org/10.1016/j.techfore.2018.07.014

Vismara, S. (2018). Information cascades among investors in equity crowdfunding. *Entrepreneurship Theory and Practice, 42*, 467–497.

Vismara, S. (2019). Sustainability in equity crowdfunding. *Technological Forecasting and Social Change, 141*, 98–106.

Vismara, S. (2022). Expanding corporate finance perspectives to equity crowdfunding. *Journal of Technology Transfer, 47*, 1629–1639. https://doi.org/10.1007/s10961-021-09903-z

Vismara, S., Paleari, S., & Ritter, J. R. (2012). Europe's second markets for small companies. *European Financial Management, 18*(3), 352–388. https://doi.org/10.1111/j.1468-036X.2012.00641.x

Vu, A. N., & Christian, J. (2023). UK equity crowdfunding success: The impact of competition, Brexit and Covid-19. *British Journal of Management*. https://doi.org/10.1111/1467-8551.12714

Walthoff-Borm, X., Schwienbacher, A., & Vanacker, T. (2018). Equity crowdfunding: First resort or last resort? *Journal of Business Venturing, 33*, 513–533. https://doi.org/10.1016/j.jbusvent.2018.04.001

Weiss, G. (2023). 'A theory of seed financing', *Available at SSRN 4668015,* https://doi.org/10.2139/ssrn.4668015

Wilson, N., Wright, M., & Kacer, M. (2018). The equity gap and knowledge-based firms. *Journal of Corporate Finance, 50*, 626–649. https://doi.org/10.1016/j.jcorpfin.2017.12.008

Wilson, N., M. Kacer and M. Cowling (2023). 'Crisis, loan schemes, bank lending, insolvency and default: An analysis of early outcomes of policy interventions', *Insolvency and Default: An Analysis of Early Outcomes of Policy Interventions.(September 2023).* https://doi.org/10.2139/ssrn.4589327

Wright, M., Hart, M., & Fu, K. (2015). *A nation of angels: Assessing the impact of angel investing across the UK*. ERC. Available at: https://www.enterpriseresearch.ac.uk/wp-content/uploads/2019/11/ERC-Angels-Report..pdf

Zhang, B., Wardrop, R., Rau, P. R., and Gray, M. (2015). Moving mainstream: Benchmarking the European alternative finance market. *Journal of Financial Perspectives*, 3(3), 60–77.