How Do Businesses Finance New Investment?

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Abstract

This paper investigates how UK firms finance new investment and whether their choices follow a financing hierarchy consistent with leading theories of capital structure. Using a survey of 2,886 firms conducted by the UK Department for Business and Trade and the Bank of England (2020–2023), we examine six financing sources: retained earnings, owner's capital, trade credit, bank loans, non-bank debt, and outside equity. Our findings show that retained earnings dominate investment financing, followed by injections of capital from owners, while bank and non-bank debt are secondary sources and outside equity remains marginal. Econometric analysis reveals that retained earnings substitute for all other sources, whereas owner's capital is complementary to both bank and non-bank debt. Financing patterns vary systematically by firm size, age, and investment type. Overall, the results provide strong support for the pecking order theory, with additional insights from life-cycle theory, and highlight the importance of policy in shaping SME access to finance during periods of economic disruption.

1. Introduction

Investment drives productivity and economic growth, yet how firms finance that investment remains central to understanding capital allocation, business scaling, and policy effectiveness. The question is particularly salient following COVID-19, when unprecedented government loan guarantees altered the financing landscape for millions of UK businesses. Understanding financing hierarchies—which sources firms prefer and how they substitute or complement one another—matters for financial regulation, lending policy, and efforts to support business growth.

How firms finance investment has been one of the central questions in corporate finance. Seminal contributions such as the Modigliani–Miller (1958) theorem, trade-off theory (Hackbarth, Hennessy, and Leland, 2007), the pecking order theory (Myers and Majluf, 1984), free cash flow theory (Jensen, 1986), and the financial life-cycle theory (Berger and Udell, 1998) have each offered different perspectives. While these theories provide valuable insights, empirical evidence has often been mixed, with results depending heavily on the types of firms studied. Much of the existing research has focused on large, listed corporations, with access to the full range of finance sources. leaving open the question of how the broader and more diverse

population of firms finances new investment. We add new and novel insights by considering the precise nature of investments made, including fixed capital (land and buildings, plant, machinery, and vehicles), innovation and technology investments (process innovation, product/service innovation, and IT), alongside growth investments in market development, and human capital investments in training.

This paper contributes new insights by analyzing a uniquely detailed dataset from a large-scale survey of 2,886 UK firms, conducted jointly by the UK Department for Business and Trade and the Bank of England between 2020 and 2023. The dataset covers firms of all sizes, sectors, and regions and captures actual financing decisions at the point of investment. It enables us to move beyond binary distinctions between debt and equity, instead examining a more nuanced hierarchy that includes retained earnings, owner's capital, trade credit, bank loans, non-bank debt, and outside equity. We evaluate the extent to which these sources act as substitutes or complements, and how usage varies by firm characteristics, investment type, and broader market conditions.

The empirical period (2020–2023) coincides with major institutional and macroeconomic disruptions. The COVID-19 pandemic and subsequent recovery, followed by sharp increases in inflation, shaped firms' financing choices. In particular, government-backed loan schemes—the Bounce Back Loan Scheme (BBL) for micro firms and the Coronavirus Business Interruption Loan Scheme (CBILS) for SMEs—altered the relative attractiveness of debt versus internal funding. These schemes created temporary but important incentives for firms to prioritise precautionary internal cash buffers while selectively accessing highly subsidised credit. Our analysis should therefore be interpreted in light of this exceptional context.

This paper makes four distinct contributions. First, we provide the most comprehensive evidence to date on how UK firms finance new investment, using a nationally representative

survey that captures realized funding decisions at the point of investment across all firm sizes, not just large or listed firms. Second, we distinguish between the financing of different investment types—including intangible assets—an area where theory predicts greater information frictions and a stronger reliance on internal funds. Third, we examine the substitutability and complementarity of financing instruments, offering direct evidence on the structure of SME financing hierarchies. In contrast to studies focused on single instruments or credit access episodes, we provide an integrated view of financing choices across the distribution of firms, including micro-enterprises. Fourth, we situate these findings within the macroeconomic and institutional context of the post-COVID recovery and rising inflation, during which government-backed loan schemes played an important role in shaping financing behaviour. The findings therefore speak both to longstanding debates on the pecking order and to contemporary UK policy concerns around growth, productivity, and the adequacy of external finance for scaling firms.

Our results reveal that firms' own retained earnings are by far the most common source of financing new investment and that 83.07% of firms use their own reserves. This implies that generating free cash flows and retaining them inside the firm are critical for investment. The next most common source is the owner's capital. Large firms do not use it, but among micro firms' reliance is high (25.35%). Bank debt is the most commonly used outside finance source, but the gap with alternative debt finance appears to have diminished with the advent of P2P lending, fintech, online banking and other new players in the debt market. Trade credit, due to its inherently short-term nature, has a relatively low usage, and outside equity is only used by 3.11% of firms overall to finance investment. However, outside equity is more commonly used by medium-sized firms which is consistent with other evidence that venture capital and private equity prefer to invest in larger, later-stage firms (Wilson et al 2018).

Our econometric analysis reveals that owner capital injections are complementary to all forms of external debt. However, owners' capital is decreasing if the firm uses its own retained earnings to fund investment. This suggests that when firms own financial reserves are sufficient to fund investment then there is less need for capital inputs from the owner as a substitute. We also find that outside equity finance is only relevant in the sense that it is a substitute for firms' use of their own retained earnings which suggests it is a special and unique form of capital.

In a broader sense, small firms (10-49 employees) appear to be the most interesting size class of firms in the sense that they are different from all other size classes of firms, micro, medium, and large, in many of their investment financing behaviours. Firms own retained earnings are particularly important, as are loans from traditional banks and non-banking lenders. Yet they are also at the beginning of a transition away from using owner capital inputs which is most apparent for micro firms.

Our findings in respect of non-bank debt also suggest that alternative finance in the form of non-bank debt is complementary to owner capital and also trade credit, but interestingly not traditional bank loans. This suggests a different type of market penetration and expansion by alternative debt finance providers who may be reluctant to take on the huge multinational banking groups that dominate the UK high street banking market. The fact that some 10.71% of firms have used this form of finance for investment suggests that over the last decade alternative debt finance providers have developed a successful strategy for entering the market which has added to the general supply of debt finance over and above that provided by traditional banks.

Innovation investments generated an interesting set of results. When a firm is investing in process innovations, we find that there is a 5.31% higher probability of the firm using bank loans. Product/service innovation, however, was associated with a 1.67% higher probability of

the firm using outside equity. In these respects, it is evident that the returns to successful innovation will largely accrue to the banks and outside equity providers. We also find that owner's capital has a 12.77% and a 11.09% higher probability of being used when a firm is investing in Land/Building and Market development, respectively. In relation to IT investments, we find that they are associated with a 7.03% higher probability of the firm using its own cash reserves.

Finally, we find that mining, quarrying, and utilities sector firms, that are all associated with larger scale investments and also longer-term investments, appear to create a unique capital structure as the financing choices are unlike those in any other industry sectors. Here we find that firms in these industry sectors had a 57.13% higher probability of using bank debt, a 35.63% higher probability of using non-bank debt, and a 20.48% higher probability of using trade credit. This set of findings suggests that firms in these sectors are the most open to taking on outside finance.

Our results are inconsistent with free cash flow theory as firms with internal cash reserves do not take on outside debt for disciplinary purposes. Rather, they substitute debt forms like trade credit and bank loans when internal reserves cannot fund investment. There is accord with trade-off theory as firms manage external debt use, although complementary to owners' capital. The issue of outside equity, though only a tiny proportion of UK firms use it for investment, remains enigmatic as it is irrelevant in determining use of all finance sources except firms' cash reserves. If a firm generates sufficient profit and retains enough to fund investment, outside equity becomes irrelevant. Overall, we find strong support for the pecking order theory, dominated by firms' retained earnings and owner's capital, but also many aspects of the Berger and Udell (1998) life-cycle theory of firm financing.

The unprecedented public loan-guarantee schemes deployed during the pandemic stabilized credit flows, but the scale of take-up highlights structural dependence on internal

funds and personal injections when conditions tighten. Looking forward, easing this reliance without disturbing the close ownership-control structures common in UK SMEs requires continued development of cash-flow lending practices, wider use of real-time accounting and payments data, and a standing risk-based public guarantee scheme that supports lending through the cycle. Complementary measures to expand equity finance provision for scaling and innovation-intensive firms, alongside stronger prompt-payment enforcement and invoice financing support, are warranted given the complementary role of trade credit and external debt identified in our analysis.

The rest of the paper is organized as follows: Section 2 reviews the main theories of capital structure and firm financing and derives testable hypotheses. Section 3 presents and discusses our data and the base sample statistics. Section 4 reports our econometric modelling results for each source of investment capital. We conclude in Section 5 by setting our findings against the theories of capital structure and firm financing set out in Section 2 and drawing policy implications.

2. Theory and Hypotheses

Classical Modigliani–Miller (1958) irrelevance provides a benchmark against which financing frictions can be identified. Under their assumptions of perfect capital markets, no taxes, no bankruptcy costs, and symmetric information, capital structure is irrelevant to firm value. However, these assumptions rarely hold in practice, and three major theories have emerged to explain how firms choose between debt and equity financing in the presence of market frictions: pecking order theory, trade-off theory, and free cash flow theory. Additionally, the financial life-cycle theory offers insights into how financing preferences evolve as firms grow and mature.

Pecking order theory (Myers and Majluf, 1984) is based on information asymmetry and suggests that firms finance their operations and investments in a defined hierarchy, starting from internal funds with the lowest information cost, followed by external debt, and equity as a last resort (Asquith and Mullins, 1986; Dierkens, 1991; Shyam-Sunder and Myers, 1999).

A concept related to POT is the value of financial flexibility (Shivdasani and Zenner, 2005) or financial slacks facilitated by retained earnings. For firms with uncertain future investment requirements and limited ability to access debt markets, financial flexibility gives them the "real option" (Damodaran, 2000) to fund valuable projects using cheaper debts rather than the more costly equity capital (Froot, Scharfstein, and Stein, 1993). Following POT, firms will prefer reinvesting their surplus to seeking external capital, which finds empirical support across both large (e.g., Shyam-Sunder and Myers, 1999) and smaller firms (Michaelas et al., 1999; Cosh et al., 2009).

Trade-off theory emphasizes debt–equity optimization based on tax shields (DeAngelo and Masulis, 1980) and expected distress costs (Kim, 1978). Firms balance the tax benefits of debt (interest payments are tax-deductible) against the costs of financial distress (bankruptcy costs, loss of customers and suppliers, fire-sale of assets). According to TOT, firms should target an optimal capital structure where the marginal benefit of debt equals the marginal cost. Profitable firms with stable cash flows and tangible assets should use more debt to capture tax shields, while firms with volatile earnings and intangible assets should use less debt to avoid distress costs.

However, TOT does not explain why, in practice, many profitable firms behave in an opposite manner and have lower debt ratios. This is known as the "debt conservatism puzzle." SMEs, in particular, often maintain lower leverage than TOT would predict, possibly because they face higher bankruptcy costs relative to their size, or because owner-managers value financial flexibility and control over tax optimization.

The free cash flow theory by Jensen (1986) further relaxes the MM assumption of no agency costs and suggests that for firms with large cash reserves, managers tend to become complacent, which leads to inefficiency and investment in poor projects, but the costs are borne by shareholders. Forcing such firms to borrow adds discipline to management and mitigates the conflicts between managers and shareholders. Two pieces of empirical evidence provide support for the free cash flow proposition. First, poorly managed, poorly run firms, where managers are not significant shareholders, are more likely to be targeted for leveraged buyouts (Palepu, 1986; Wruck, 1995). Second, there is evidence of improvements in operating efficiency at firms that increase their debt ratio substantially (Kim and Sorensen, 1986). However, this theory is less applicable to SMEs where ownership and management are typically aligned. In closely-held firms, the owner-manager bears both the benefits and costs of their decisions, reducing the agency problem that free cash flow theory addresses.

All the above theories implicitly assume that alternative sources of external finance are available if needed, but this may not be true for small businesses, for example, due to their limited availability of collateralizable assets required by commercial banks (Cowling et al., 2016). Berger and Udell (1998) in their seminal work document some notable differences between smaller and larger firms, and essentially relate age, size, and information availability to more sophisticated forms of capital alongside a continued demand for short- and medium-term bank loans.

In general, start-up firms are heavily reliant on internal finance including owner's equity, but contrary to conventional wisdom, equity finance by angel investors may be the only source of external finance since their information opaqueness likely deters most external financiers. The availability of intermediate external finance, such as commercial bank loans and venture capital, will increase with the growth of small businesses, and generally follows the financial pecking order discussed before. However, this finance sequence could be reversed

if instead the informational advantage is on the investor side, especially in the case of high-risk, high-growth entrepreneurial ventures (Garmaise, 2007).

For small firms, limited capital-market access and heightened financial vulnerability make achieving an optimal structure more challenging; surplus internal funds therefore provide valuable flexibility. SMEs with excess liquidity may use retained earnings not only to avoid external financing but also to actively manage leverage by retiring debt to reduce distress risk or repurchasing equity to raise leverage when optimal. Empirically, SMEs' opaque information environments and owner-manager control strengthen pecking order tendencies.

Additionally, SME owner-managers often exhibit strong control aversion (Cressy, 1995), preferring to maintain full ownership and control rather than diluting equity stakes. This control preference reinforces the pecking order: owner-managers will use internal funds first, then debt (which does not dilute ownership), and will avoid external equity unless absolutely necessary. Cressy (1995) stated that the optimum strategy for the control-averse owner-manager will be to borrow less than the profit-maximizing amount if their control aversion is strong enough, with the corner solution being for the business to be entirely self-funding.

Recent financial innovation—including peer-to-peer lending, crowdfunding, challenger banks, and expanded venture capital—has reshaped financing landscapes, especially for SMEs (Chatelain, 2002; Mac an Bhaird, Owen, and Freel, 2019; Cumming and Johan, 2017; Cumming, Deloof, Manigart, and Wright, 2019). These developments imply that firms' capital structure choices must be understood dynamically, across both firm characteristics, financial innovation, and institutional contexts. For example, if traditional high street banks, which formerly held a very dominant market position in the UK of around 80% of customer accounts and SME lending (Ashton and Keasey, 2005; Graham, 2013), raised their account service and loan prices above the competitive level, then new alternative debt providers could erode their market shares by offering lower-cost services (in the case of challenger and

online banks) and loans (in the case of P2P lending). Equally, if the tax treatment of equity investment changed, then this would alter the relative cost of capital to firms.

Therefore, empirical investigation into firms' capital structure decisions should take a dynamic perspective and realize that "showing what doesn't matter can also show, by implication, what does" (Miller, 1988, p. 100).

2.1 Hypotheses

We expect retained earnings to dominate, owner injections to act as a bridge to external debt, and external equity to be rare and concentrated among innovative or scaling firms. Where bank credit is constrained or intangible assets dominate, we expect internal funds to substitute for debt, whereas trade credit and owner capital may complement formal finance. These expectations motivate our empirical tests and lead to the following testable hypotheses:

H1: Companies with higher retained earnings use higher debt and/or lower external equity to finance new investments.

If trade-off theory holds, firms should balance the benefits and costs of debt. Firms with strong internal cash flows should be able to service more debt and thus take advantage of tax shields. We would therefore expect a positive relationship between retained earnings and debt usage.

H2a: Retained earnings are the dominant source of new investment financing.

If pecking order theory holds, internal funds should be preferred due to the absence of information asymmetry costs. We expect the vast majority of firms to use retained earnings to finance at least part of their investment.

H2b: Companies with higher retained earnings have lower external debt and/or external equity use in financing new investments.

Following from H2a, if firms follow a pecking order, those with sufficient internal funds should avoid external finance. We expect retained earnings to substitute for all forms of external finance.

H3a: Firm size and age are positively associated with the use of internal finance and owner equity in financing investments.

Younger and smaller firms typically have less access to external finance and must rely more heavily on owner's capital and any retained earnings they have accumulated. As firms grow and mature, they build reputation and collateral, gaining access to external finance.

H3b: Firm size and age are negatively associated with the use of external debt in financing investments.

As firms mature and accumulate retained earnings, their dependence on external debt should decline. However, this hypothesis is nuanced: very small firms may have limited access to external debt due to information opaqueness, while medium-sized firms may have both access and need for external debt. The relationship may therefore be non-linear.

This theoretical framework motivates our empirical analysis. However, as Myers (2001) stated, there is no universal theory of capital structure in respect of the debt-equity choice, nor of the determinants of these choices. By examining how UK firms actually finance new investment, and whether their choices reflect a hierarchy consistent with the pecking order or other theories, we contribute new evidence on the determinants of investment financing across the full firm population.

3. Data and Sample Statistics

The data is derived from a joint survey commissioned by the UK Department for Business and Trade (DBT) and the Bank of England (BoE) of firms across the full size, industry, and regional spectrum in the UK business sector in 2023. The survey covers new

investment made by firms between, and including, 2020-21 through to 2022-23, a three-year window from the Covid-19 pandemic period onwards. The survey was designed to capture detailed information about firms financing and investment decisions, including what investments they have made and how they have financed them. A critical feature of the survey design is that it mitigates endogeneity between financing and investment decisions. Respondents' first report whether they undertook investment in the reference period and only subsequently identify how it was financed. This temporal ordering reduces reverse-causality risk, as firms report realized investment events rather than anticipated intentions.

The survey was administered to a sample of UK firms using a stratified sampling approach drawn from the full UK business population estimates based on size, sector (1 digit SIC) and spatial characteristics (UK standard geographic regions). As per the UK business population, the survey is dominated by micro firms (0-9 employees), with diminishing representations of small firms (10-49 employees), medium-sized firms (50-249 employees), and large firms (>249 employees). Thus, there are very few firms that are public limited companies in the sample, or the UK business population. There are only 1,300 public listed firms from a total business population of 5.5 million of which 1.4 million are employer businesses.

In total, 2,886 firms completed the survey, and a sample weighting was constructed to align the survey responses to the known UK business population structure in terms of firm size class and industry distributions. Most firms in the UK are micro enterprises (1–9 employees). In 2023, 1.18 million of the 1.45 million employer businesses fell into this category. In comparison, there were only 7,960 large firms in the UK in 2023.

The firm size distribution is also important as Crespi and Scellato (2010) identified a specific inverted 'U' shaped relationship between ownership concentration (high in small firms) and the sensitivity of investment to cash flows. Table A1 in the Appendix shows the

industry sector and region distribution of the firms in the sample. The most populous industry sectors are wholesale and retail, construction, and professional, scientific and technical services. The typical firm is an owner-managed sole proprietorship, which means it is closely held in terms of its ownership and also in terms of its management. These features have clear implications for agency theory as there is no divorce of ownership and control of the business. In many small firms, ownership and control remain closely aligned: one or two shareholders typically sit on the board and directly shape the strategic direction of the business. A key objective is often to maintain tight ownership control (Cowling, 2003).

Table 1: Firms Sources of Capital to Fund New Investment

Source of Capital	Definition	Mean %	Std Dev
Firms cash reserves	Cash reserves from within the business from retained earnings	83.07	37.52
Owner's capital	Personal funds from the owners(s), partners or directors	22.82	41.98
Trade credit	Credit advanced from a supplier to the firm	9.01	28.65
Bank debt	Bank loans	17.46	37.98
Non-bank debt	Non-bank loans	10.71	30.94
Outside equity	Equity capital provided by individuals or organisations outside of the firm	3.62	18.68

Notes: The variables for each source of capital listed in the table here are dummy variables, where 1 indicates the use of the source and 0 otherwise.

For the focus of the paper, we report the definition, mean and the standard deviations of the variables indicating firm's use of each source of capital in Table 1. The variables are coded in binary form where a 0 indicates the firm did not use that source and 1 if the firm used that source. In the survey, retained earnings (internal cash) refers specifically to profits accumulated and kept within the business, not funds raised externally. Owner's capital is defined as direct injections of funds from existing controlling shareholders—typically entrepreneurs or family owners—who provide personal resources to support investment. This is conceptually distinct

from outside equity, which entails raising capital from external investors such as business angels, venture capitalists, or private equity funds. We emphasise this distinction because it reflects the strong control aversion of many SMEs, where owner injections preserve ownership and control, while outside equity dilutes it.

We observe that firms own cash reserves from retained earnings is the dominant form of capital used, and 83.1% of firms fund at least some of their new investment from their own reserves. This is entirely consistent with the POH and firms own cash being the first-choice option for financing new investment. The second most common source of investment capital is owner's personal capital, used by 22.8% of firms. This is, at least in smaller, owner-managed, firms a form of internal finance. Outside debt, and particularly bank loans, are the third most commonly used source of investment capital, although non-bank debt is more widely available in the last decade as alternative finance (for example, P2P lending) has gained market penetration (Allen, Carletti, and Valenzuela, 2013).

In contrast, outside equity, which entails sharing the legal ownership of the business, and a residual claim on the future stream of profits, is a comparatively insignificant source of investment capital for the majority of UK firms which maintain their closely-held ownership structure. Only 3.6% of UK firms have used outside equity to finance new investment since 2020-2021. Taken together, our results are consistent with POT and can, at least in part, be explained by firms control aversion as set out formally by Cressy (1995) who stated that the optimum strategy for the control averse owner-manager will be to borrow less than the profit maximising amount is their control aversion is strong enough when the corner solution is for the business to be entirely self-funding.

Table 2 reports the use of sources of investment finance by firm size classes. Here we find that all firm size classes use firms retained earnings to finance their investments to a large extent, although this is lowest for micro firms where only 81.17% use retained earnings

(internal cash), and highest for small firms for whom 91.91% use retained earnings (internal cash). Owner capital diminishes strongly in the firm size class, from 25.35% in micro firms, to 14.70% in small firms, to only 4.43% in medium-sized firms and down to absolutely zero for large firms. This emphasises the importance of owner capital for the financing of investment in the most numerically dominant firm size class which is micro firms, although Ercolani (2013) showed that there may be significant 'gestation lags' between deciding to make an investment and activating it which suggests that owners might have been building up capital ready for future investment. Trade credit use follows an inverted 'U' shape which peaks for small firms at 10.33% and is lowest for large firms at 6.15%.

Table 2: Firm Size and Sources of Investment Finance (mean and standard deviation)

	Micro	**Small**	**Medium**	**Large**
Firms cash reserves	81.87	91.91	85.68	86.09
Std Dev	[39.12]	[27.30]	[35.10]	[35.10]
Owner's capital	25.35	14.70	4.43	0.00
Std Dev	[43.53]	[35.46]	[20.63]	[0.00]
Trade credit	8.86	10.33	6.84	6.15
Std Dev	[28.43]	[30.47]	[25.29]	[24.36]
Bank debt	17.05	19.34	18.22	18.94
Std Dev	[37.63]	[39.55]	[38.69]	[39.74]
Non-bank debt	10.08	14.03	9.46	15.39
Std Dev	[30.12]	[34.78]	[29.33]	[36.60]
Outside equity	3.11	5.52	6.67	1.83
Std Dev	[17.38]	[22.86]	[25.01]	[13.60]
No. Observation	785	345	223	36

Notes: The UK size class definitions are as follows: Micro firm (0-9 employees); Small firm (10-49 employees); medium-sized firm (50-249 employees), and large firm (>249 employees). For each firm size class, we report the mean and standard deviation of the dummy variables indicating a firm's use of capital to finance investment.

Bank debt is fairly constant across firm size classes at between 17.05% for micro firms and 19.34% for small firms with medium and large firms falling between the two. However,

for non-bank debt, large firms have the highest use at 15.39% and medium-sized firms the lowest at 9.46%. The findings in relation to outside equity show that it is strongly increasing initially, with 3.11% of micro firms using outside equity, 5.52% of small firms, and 6.67% of medium-sized firms. However, large firms have the lowest use of outside equity to finance investment at only 1.83%. Overall, the lower use of retained earnings/internal cash and higher use of owner capital is a distinctive feature of how micro firms finance investment.

Table 3: Firm Age Class and Sources of Investment Finance (mean and standard deviation)

	0-3 years	4-10 years	11-20 years	>20 years
Firms cash reserves	73.88	80.77	80.47	85.84
Std Dev	[43.38]	[39.54]	[39.63]	[34.85]
Owner's capital	35.80	28.99	22.82	20.41
Std Dev	[48.44]	[45.52]	[42.02]	[40.33]
Trade credit	8.27	9.52	9.17	8.87
Std Dev	[27.84]	[29.44]	[28.90]	[28.45]
Bank debt	16.03	21.83	18.46	16.01
Std Dev	[37.07]	[41.45]	[38.84]	[36.70]
Non-bank debt	6.42	10.67	11.57	10.55
Std Dev	[24.76]	[30.97]	[32.03]	[30.74]
Outside equity	2.67	2.23	3.30	4.19
Std Dev	[16.29]	[14.82]	[17.89]	[20.05]

Notes: Age refers to the number of years since the firm was founded and began trading. For each firm age class, we report the mean and standard deviation of the dummy variables indicating a firm's use of capital to finance investment.

Table 3 reports on firms' use of finance sources for investment by four age classes from early stage (0-3 years) through to well established firms (>20 years). We observe that use of firms' own cash reserves is increasing in the firm age class from 73.88% for the youngest class of early-stage firms to 85.84% for the oldest age class of firms. In contrast, use of owners' capital is diminishing in the firm age class from 35.80% for early-stage firms to 20.41% for the oldest age class of firms. Use of trade credit is a minor source of investment finance and there is not

much variation across firm age classes. However, bank debt use follows an inverted 'U' shape in the firm age class and peaks at 21.83% in the 4-10 years old firm age class. In contrast, early-stage firms have the lowest use of non-bank debt at 6.42% and established (11-20 years old firms) the highest use at 11.57%. Outside equity, which is a very minor source of investment finance generally, is much more prevalent amongst firms over the age of ten and peaks for the oldest age class of firms at 4.19%. Overall, early- stage firms are more dependent upon owner's capital and more established firms on retained earnings, non-bank finance, and outside equity.

Table 4: Pairwise Correlations between Sources of Investment Capital

Source of Capital	(1)	(2)	(3)	(4)	(5)	(6)
(1) Firms cash reserves	1.000					
(2) Owner's capital	**-0.241**	1.000				
(3) Trade credit	**-0.086**	**0.136**	1.000			
(4) Bank debt	**-0.129**	**0.150**	**0.210**	1.000		
(5) Non-bank debt	**-0.087**	**0.142**	0.130	**0.087**	1.000	
(6) Outside equity	**-0.159**	0.048	**0.067**	-0.017	**0.074**	1.000

Notes: The values in the matrix table show the pairwise correlation between the dummy variables indicating the source of investment capital. Specifically, the values highlighted in bold are the correlation coefficients which are statistically significant.

The pairwise correlations in Table 4 highlight some interest associations between the different sources of investment capital. For example, column (1) reveals that retained earnings use to fund investment is negatively and significantly correlated with all other sources of capital. The largest negative correlation is with the owner's capital. This implies that (a) all other forms of capital are substitutes for retained earnings (internal cash), and (b) that owner's own capital is the closest substitute. It is also the case that owners' own capital, trade credit, bank debt and non-bank debt are complements. This suggests that for outside debt providers, the owner having 'skin in the game' is an important signal of their commitment to their investment project.

In terms of alternative debt, we find it is positively and significantly correlated with traditional bank debt which implies that they are complements rather than substitutes. In turn non-bank debt is positively correlated with outside equity. This is intriguing and may suggest that if firms have to seek recourse to non-bank debt, then they are that far down the pecking order that even outside equity is a viable option. The general lack of use of outside equity is consistent with owners control aversion, and the insignificant correlation with owner's personal capital suggests that internal and external equity are not substitutes, or indeed complements.

4. Empirical framework and Results

Our empirical strategy examines how firms finance new investment by modelling the probability of using each major source of funds. We estimate a set of binary outcome models of the form:

$$Pr\ (F_i = 1 \mid X) = \Phi(\alpha + \beta I_i + \gamma C_i + \delta S_i + \theta R_i + \mu_t)$$

where F_i denotes whether firm i used a given source of finance (retained earnings, owner capital, bank debt, non-bank debt, external equity, or trade credit). I_i captures investment type (e.g., machinery and equipment, buildings, IT and software, training), C_i is a vector of firm characteristics (age, turnover, employment size, legal form), S_i represents sector fixed effects, R_i denotes region dummies, and μ_t controls for survey cycle effects. We estimate probit models and report marginal effects evaluated at sample means. In Appendix Table A2, we report the base model for each of the six sources of finance including key firm characteristics which includes firm size class, 1-digit industry sector code, standard UK geographic region, and firm age (model 1A, 2A, 3A, 4A, 5A and 6A). We then augment the control vector to include our seven different types of investment (land & buildings, plant, machinery & vehicles, process innovation, IT, market development, product/service innovation, and training) (model 1B, 2B, 3B, 4B, 5B and 6B). Our final model further augments the estimation by including a full set of finance source use dummy variables, excluding in each case the specific finance

source being modelled to test for complementarity or substitution effects between the finance sources which we report as a summary table of marginal effects (Appendix Table A3).

This approach enables comparison of financing choices across a mutually exclusive set of instruments, recognising that many firms combine multiple sources. By modelling each margin separately, we avoid imposing a restrictive ordering ex ante and instead assess whether firms' revealed behaviour is consistent with a pecking-order hierarchy or trade-off logic. The models control for observable determinants of financing capacity — including scale, age, and organisational form — while isolating the incremental association between investment characteristics and funding choice.

Identification rests on the contemporaneous nature of the UK Finance and Investment Decision Making Survey. Firms report specific investment events and then indicate how those investments were financed. The timing reduces concerns that financing responses are based on anticipated rather than realised investment. Sector, region, and size-band controls mitigate unobserved heterogeneity arising from market structure and financial access conditions. Robustness checks examine alternative link functions and subsets of the sample. Throughout, we interpret coefficients cautiously given unavoidable limits to causal identification in survey research; our focus is on documenting systematic patterns in firms' revealed financing behaviour and assessing their consistency with competing theoretical frameworks.

A natural concern is potential endogeneity between financing choices and investment decisions. In principle, financing availability may influence whether investment occurs, while investment plans may shape financing search and outcomes. As discussed above the design of the UK Finance and Investment Decision Making Survey mitigates this concern: respondents first report whether they undertook investment in the reference period and only subsequently

identify how it was financed, reducing reverse-causality risk.[1] Our models therefore condition on realised investment events rather than anticipated intentions. We also include firm size, age, legal status, sector and region controls to capture systematic differences in access to finance. Nonetheless, we cannot fully eliminate endogeneity risks — in particular, unobserved managerial quality or opportunity sets may correlate with both financing mix and investment behaviour. We therefore interpret our results as documenting robust associations consistent with a pecking-order pattern, rather than making strong causal claims, while noting the value of future work linking survey responses to administrative loan-level data.

We report our main econometric results in seven sub-sections which cover each specific set of findings in relation to (a) complementary and substitute sources of finance for investment, (b) firm size effects, (c) alternatives to traditional bank loans, (d) investment types, (e) industry sector, (f) spatial differences, and (g) firm age.

Prior to our core analysis, we consider whether or not firms' cash reserves are the result of external financing. To test for this, we run a basic probit regression model with the firm's cash reserves, coded in binary form where a 0 indicates the firm did not use their cash reserves and 1 if the firm did, against all other potential sources of finance. The model is well specified and shows that trade credit and non-bank debt are insignificant, but owner's funds reduce the probability of using firms cash reserves by 18.87%, bank debt reduces the probability of using firms cash reserves by 9.33%, and external equity reduces the probability of using firms cash reserves by 29.78%. These findings suggest that firms cash reserves do not represent

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[1] Although the reverse-causality risk was reduced by the survey design, we check whether the sources of finance are associated with the certain type of investments in Table A4 to address the concern. The result shows that Owner Funds and Bank Debt are complementary sources of finance for Investment in land and building, and Process Innovation. Additionally, Retained Earnings and Trade debit are complementary sources of finance for Investment in Plant, Machinery and Vehicles, and IT. However, we believe the result Table A4 only suggests association rather than causality.

components of external financing and are simply the internal reserves that the firm has accumulated from its trading activities. Thus, we replace cash reserves with retained earnings[2].

4.1 Complements and Substitute Sources of Finance

Table 5: Summary of Complementary and Substitutive Relationships between Financing Sources.

	Firms Cash Reserves	Owners Capital	Trade Credit	Bank Debt	Non-bank Debt	Outside Equity
Firms Cash Reserves	N/A	S	S	S	0	S
Owners Capital	S	N/A	C	C	C	0
Trade Credit	0	C	N/A	C	C	0
Bank Debt	S	C	C	N/A	0	0
Non-bank Debt	0	C	C	0	N/A	0
Outside Equity	S	0	0	0	0	N/A

Notes: This table summarises the relationship between each finance source based on the regression estimation result in Appendix B. Here, S indicates the two finance sources are substitutes, C indicates the two finance sources are complements, and 0 indicates they are neither.

Table 5 summarises the relationships between financing sources derived from our augmented regression models which are presented in Appendix Table A3. Rather than presenting the full set of coefficients here, we classify each pair of financing sources as either substitutes, complements, or unrelated. The results show that retained earnings/internal cash act as substitutes for all other forms of finance, while owners' capital is complementary to trade credit, and both bank and non-bank debt. Trade credit is complementary to owner's capital and external debt, but not to outside equity. Both bank and non-bank debt are complementary to owners' capital and trade credit, but bank debt is a substitute for firms' own retained earnings. Outside equity appears as a special case: it is unrelated to other forms of finance except as a

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[2] Here, we report the results using retained earnings in the main manuscript. The detailed result for the basic probit regression model with the firm's cash reserves is available upon request.

substitute for retained earnings. This highlights the special nature of outside equity as a finance source and the specific implications for the firm of raising outside equity.

Having discussed the basic evidence relating to complementarity or substitutability of different sources of finance for investment, we now add more detail by reporting and discussing the relative probabilities that once a firm has used a specific source of finance this will be associated with a particular increase or decrease in the probability that it will use another specific source of finance. In short, we consider the relative magnitude of these effects (the detailed marginal effects are reported in Table A3 in the Appendix). This will help establish what the pecking order, or hierarchy of finance, is. For example, if a firm uses its own internal cash reserves, then this will reduce the probability of using owner funds by 22.92%, reduce the probability of use of bank debt by 13.28% and the chance of using outside equity by 6.10%. If a firm uses owner's capital or trade credit, then it will have a 7.48% and a 5.96% higher probability respectively of using non-bank debt, but the probability of using bank debt increases by 6.30% and 19.81%, respectively. The probability of using trade credit increases with firms' use of owner capital by 4.90%, bank debt by 9.80%, and non-bank debt by 4.57%.

Owner capital is increasing in firms' use of non-bank debt by 14.09%, bank debt by 7.99%, and trade credit by 13.61%. This highlights the fact that owner capital injections are complementary to all forms of external debt. However, owners' capital is decreasing if the firm uses its own cash reserves to fund investment. This suggests that when firms own financial reserves are sufficient to fund investment then there is less need for capital inputs from the owner as a substitute. Finally, firms' retained earnings used for investment have a decreasing probability of the firm using owner capital by 16.86%, if the firm uses bank debt by 12.62%, and when the firm accesses outside equity by 32.46%. Thus, even when other sources of investment finance are substituting for each other, the precise nature of the trade-offs is different between each unique pair of finance sources. The largest magnitude of these trade-

offs is in the context of use of firms own cash reserves, and particularly in relation to outside equity use.

Focusing on the POT, we conclude that if we assume that the first-best finance option begins with the use of firms own internal cash reserves, which in fact is the most common source of investment capital and cited by 83.07% of firms, then we can use the substitution effect coefficients for retained earnings/internal cash from each other finance source model and rank order them. The largest marginal probability effect is for firms' own retained earnings on owner's capital which is of the order of -22.92%. Thus, owners' capital is the second source of capital in the firm's pecking order behind firms own cash reserves. Third in the pecking order is bank debt with a marginal probability of -13.28% from firms own cash. Fourth is outside equity which has a marginal probability effect of -6.10%, and fifth is trade credit with a marginal probability effect of -4.21%. Non-bank debt is not in the pecking order, although it is complementary to owner capital and trade credit.

4.2 Firm Size Effects

Table 6: Marginal Effects of Key Firm Characteristics on Financing Choice (selected results)
(Full regression models with coefficients and standard errors are reported in Appendix Table A2)

Financing Source	Firm Size Effect			Age Effect	Tolerance of Risk
	Small VS Micro	Medium VS Micro	Large VS Micro	Older (>20 years) VS New (0-3 years)	
Retained Earnings	+8.77%***	0	0	0	0
Owner's Funds	-9.93%***	-19.75%***	0	0	+2.63%**
Trade Credit	0	0	0	0	+1.60%**
Bank Debt	0	0	0	0	0
Non-Bank Debt	+4.15%*	0	+17.79%*	0	0
Outside Equity	+1.81%*	+6.70***	0	0	+0.91%**

Notes: *** = significant at the 1% level, ** = significant at the 5% level, and *=significant at the 10% level. A zero indicated statistical insignificance.

Table 6 reports the average marginal effects of key firm characteristics on financing choices. This shorter version of the regression output highlights only the principal effects of firm size, age, and risk on the probability of using each financing source. For example, small firms are about 9 percentage points more likely than micro firms to use retained earnings, but nearly 10 percentage points less likely to use owner's capital. Larger firms are more likely to use non-bank debt, while age does not seem to be a significant factor of the use of finance. The full regression outputs, including all coefficients, standard errors, and robustness checks, are presented in Appendix Table A2.

We can also set our empirical findings in the context of the Berger and Udell (1998; 2006) life-cycle theories of firm financing which begins with insider finance which is, in their exposition, owner equity plus debt. Here the only substitute for owners' capital is the retained earnings (internal cash) which is a strong substitute. However, in order of the magnitude of complementarity, non-bank debt, bank debt, and trade credit are also complementary to owners' capital. This is consistent with an owner's own capital input sending a positive signal to providers of debt (Shailer, 1999). In respect of firm size classes, which are central to this life-cycle theory, we find that small firms (10-49 employees) are significantly more likely to use firms' own retained earnings and non-bank debt. Trade credit has no firm size class pattern indicating that it is a more general and widely used form of short-term debt as per the Berger and Udell (1998) model. Use of owner's capital is strongly diminishing in firm size classes with medium firms being 19.75% less likely to use it which reflects the ability of relatively larger firms to access institutional shareholder capital for investment. In respect of outside equity, we observe that small firms have a 1.81% higher probability of using outside equity than micro firms and this increases to a 6.70% higher probability for medium-sized firms (50-249 employees). This is entirely consistent with the firm size life cycle as outlined by Berger

and Udell (1998) as firms transition from business angel finance to venture capital if outside equity is raised.

In a broader sense, small firms (10-49 employees) appear to be the most interesting size class of firms in the sense that they are different from all other size classes of firms, both micros, medium, and large, in many of their investment financing behaviours. Firms own retained earnings are particularly important, as are loans from traditional banks and non-banking lenders. Yet they are also at the beginning of a transition away from using owner capital inputs which is most apparent for micro firms. This separation between the financing needs of micro firms and small firms was also evident in the Covid-19 period in the UK when the government initiated two separate loan guarantee schemes. The Bounce Back Loan scheme (BBL) allowed lending up to £50,000 (to a ceiling of 25% of average annual sales over three years) and was targeted at micro firms (Cowling, Wilson, and Liu, 2024) and had an average loan size of £38,000. The Coronavirus Business Interruption Loan Scheme (CBILS) allowed lending up to £5m, although the average guaranteed loan was in the region of £264,000 (Cowling, Nightingale, and Wilson, 2023). The BBL scheme had a 100% public guarantee and a fixed interest rate of 2.5% and the CBILS an 80% public guarantee and allowed lenders to set their own interest rates.

Our results are clearly inconsistent with free cash flow theory in the sense that firms with internal cash reserves from retained earnings do not take on outside debt. Rather, they substitute forms of debt such as trade credit and bank loans when internal reserves are not available to fund investment. There is some degree of concord with trade-off theory in the sense that firms appear to manage their use of external debt, although it is complementary to owners' capital. The issue of outside equity, although only a tiny proportion of UK firms use it to fund investment remains an enigma in many ways as it is irrelevant in the determination of use of all sources of finance except for firms own cash reserves from retained profits. In short, if a

firm generates sufficient profit and then retains enough to fund its investment then outside equity becomes an irrelevance.

4.3 Alternatives to Traditional Bank Loans

The issue of new alternative finance is also interesting. Recent research has questioned whether it is substituting for traditional sources of finance, which implies no net increase in aggregate supply of capital, or complementary, which implies that it adds to the total stock of capital. Casey and O'Toole (2014), across the Eurozone, find that alternative finance and trade credit are increasingly used if a firm faces credit rationing, and Cowling et al (2023) find that innovative and high-tech firms, those facing acute information problems, also defer to alternative finance when traditional bank loans are difficult to access (Cowling, Liu, and Zhang, 2021). These findings suggest that alternative finance complements traditional sources and adds to a firm's total capital. Our findings in this respect also suggest that alternative finance in the form of non-bank debt is complementary to owner capital and also trade credit, but interestingly not traditional bank loans. This suggests a different type of market penetration and expansion by alternative debt finance providers who may be reluctant to take on the huge multinational banking groups that dominate the UK high street banking market.

4.4 Does Investment Type Matter?

In this subsection we consider whether firms' choice of investment finance differs according to the precise nature of the investment. For example, do firms finance fixed asset investments (e.g. land and buildings) differently from human capital development (e.g training)? This is generally ignored in investment finance research in favour of a focus on innovation driven or conventional investment (Tufano, 2003; Brancati, 2015; Lee, Sameen, and Cowling, 2015), and is also not a focus in the Berger and Udell (1998) life-cycle theory and model, although the presence of collateral as firms grow and age is a major focus and this is clearly linked to the firm having physical assets. However, Berger and Udell (1998) do

consider an important dichotomy between short-medium-and long-term debt, which they argue is shaped by firm size.

The specific investments we consider are fixed capital (land and buildings and plant, machinery, and vehicles), innovation (process innovation, product/service innovation, and IT), growth (market development), and human capital enhancing (training). Our results (in Appendix Table A2) show that firms financing investment in plant, machinery, and vehicles have a 7.56% higher probability of using their own retained earnings, a 6.25% higher probability of using trade credit, a 6.60% higher probability of using bank debt, and a 4.77% higher probability of using non-bank debt. Land and buildings investment was associated with owners' capital, with a 12.77% higher probability, and bank debt, with a 16.33% higher probability. These findings are generally consistent with firms using bank debts to support investment in fixed assets which are tangible in the sense that in default the bank can seek asset recovery.

Innovation investments generated an interesting set of results (See Appendix Table A2). When a firm is investing in process innovations, we find that there is a 5.31% higher probability of the firm using bank loans. Product/service innovation, however, was associated with a 1.67% higher probability of the firm using outside equity. In these respects, it is evident that the returns to successful innovation will largely accrue to the banks and outside equity providers. We also find that owner's capital has a 11.09% higher probability of being used when a firm is investing in Market development. This suggests that the returns to investment in outward, market facing, innovation will accrue largely to the entrepreneur (owner) if successful. In relation to IT investments, we find that they are associated with a 7.03% higher probability of the firm using its own cash reserves. This suggests that IT investments are particularly sensitive to firm's free cash flow and retention. We also find that financing investment in training and human capital

development does not influence firm's choice of finance, nor indeed does investment in market development.

4.5 Industry Effects

We might expect that the industry sector is particularly influential in the determination of firms' investment financing decisions for a number of reasons including the availability of fixed assets and collateral, the life-cycle of investment returns, the variability of cash flows, differences in profit rates, and different investment demands *per se*. On this, we find that firms in the hospitality sector which was one of the most impacted by the Covid-19 pandemic closures had a 32.76% higher probability of using bank loans and a 48.50% higher probability of using non-bank loans to finance investment (Appendix Table A2).

Specifically, for bank debt, we find that many industry sectors, including mining & quarrying, utilities, manufacturing, transportation & storage, financial & insurance activities, all had higher probabilities of financing investment with bank debt. For non-bank debt, we find that mining & quarrying, utilities and accommodation & food service activities had higher probabilities of using this form of investment finance. However, the most interesting results relate to the mining, quarrying and utilities sector. Here we find that firms in these industry sectors had a 57.13% higher probability of using bank debt, a 35.63% higher probability of using non-bank debt, and a 20.48% higher probability of using trade credit (Appendix Table A2). This set of findings suggests that firms in these sectors with larger scale and longer-term investments are the most open to taking on outside finance.

4.6 Spatial Differences

The issue of spatial differences in firms' choice of investment finance has been the subject of intense research efforts in economic geography (see Ughetto, Cowling, and Lee, 2019; Karna and Stephan, 2022; Andersson, Eklund, and Tsvetkova, 2023, for some recent

contributions). In general, spatial differences have been identified in both access to finance and in terms of the terms on which finance is offered. In the UK specifically, large and persistent regional differences are pervasive between the rich and economically dynamic region around and including the capital city of London and the rest of the UK (Lee and Brown, 2017). More generally, even stronger differences have been identified for venture capital and its spatial distribution (Lingard-Christensen, 2007; Chen et al, 2010), and this extends to business angel finance (Cowling, Brown, and Lee, 2021).

However, our findings in relation to spatial differences in firm's choice of investment capital are sparse and generally suggest that geography is of minor importance. Apart from firms in London having a 5.75% higher probability of using outside equity, there are two other exceptions, with firms in Northern Ireland having a 10.98% higher probability of accessing outside equity, and firms in East Midlands having a 5.29% lower probability of using trade credit (Appendix Table A2). Overall, our results suggest that the investment financing decisions of UK firms are largely spatially blind and other factors are driving these choices.

5. Conclusions

This paper has examined how UK firms finance new investment and whether their choices follow a discernible financing hierarchy. Using survey data covering 2,886 firms across all size classes, industries, and regions between 2021 and 2023, we have been able to evaluate both the prevalence of financing sources and their substitution or complementarity relationships. A novel contribution is that we are able to test these established theories in the context of the deepest crisis since the Wall Street Crash of 1929. Further, we were able to establish which finance sources are substitutes for one another and this is particularly important if one financing channel is diminished at a particular point in time, such as bank lending during crisis periods.

Our findings reveal a clear set of financing preferences that are consistent with the pecking order theory (H2a and b). Our evidence strongly supports a pecking-order hierarchy: firms rely primarily on internal funds and owner capital, with external debt as secondary and outside equity used very infrequently. Importantly, these preferences are not defined solely by prevalence but also by substitution effects: retained earnings displace most other funding sources, whereas owner capital tends to accompany debt financing, signalling the importance of owners' commitment in accessing outside finance. Outside equity appears as a special case, relevant only as a substitute for retained earnings, which underscores the persistence of ownership-control preferences in UK firms.

Financing patterns vary systematically by firm size, age, and type of investment. Micro and young firms remain reliant on owner injections (H3a), while larger and older firms are more able to access external debt (H3b). The type of investment also matters; for example, product/service innovation is strongly linked to owner financing, while IT investments rely more heavily on retained earnings. Industry effects are also present, with capital-intensive sectors such as mining and utilities displaying a greater propensity to use outside equity.

The macroeconomic context is critical. The survey period coincided with the COVID-19 recovery, rising inflation, and the introduction of unprecedented government-backed loan schemes (BBL and CBILS). These institutional factors shaped firm behaviour, encouraging precautionary saving while providing subsidised access to external credit. Our results therefore reflect both enduring theoretical regularities and the exceptional circumstances of recent years. These results must be interpreted against the backdrop of the post-pandemic recovery and rising inflation, during which firms faced heightened uncertainty and made financing decisions partly influenced by government-backed loan schemes. The dominance of retained earnings in our data may therefore reflect not only pecking order preferences but also precautionary saving behaviour reinforced by macroeconomic shocks.

Overall, the evidence is most consistent with the pecking order theory and, to a lesser extent, life-cycle models of firm financing. Free cash flow and trade-off theories receive little empirical support in this setting. In policy terms, our results underline the centrality of internal finance in supporting investment across the UK business population, and the associated vulnerability that arises when external markets tighten. As Table 5 shows, retained earnings substitute for all other sources of finance, with a 22.92% reduction in the probability of using owner capital and a 13.28% reduction for bank debt when internal funds are available. This hierarchy is reinforced in Table 6, where small firms are around 9% more likely to use retained earnings than micro firms, yet nearly 10% less likely to use owner capital, signalling a gradual transition in financing behaviour as firms scale.

The loan-guarantee schemes implemented during the pandemic effectively stabilized credit flows. However, the extensive utilization of these schemes underscores a structural reliance on internal funds and personal financial contributions during periods of economic tightening. To mitigate this dependence while preserving the prevalent ownership-control structures in UK SMEs, it is imperative to advance cash-flow lending practices, expand the use of real-time accounting and payments data, and establish a permanent risk-based public guarantee scheme that supports lending throughout the economic cycle.

Complementary measures to expand equity finance provision for scaling and innovation-intensive firms, alongside stronger prompt-payment enforcement and invoice financing and support (eg trade credit insurance), are warranted given the complementary role of trade credit and external debt identified in Table 5. Taken together, these reforms would help build a more resilient and diversified financing environment in which internal funds remain valuable, but are no longer a binding constraint on UK investment and growth.

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Appendix A

Table A1: Sample Region and Sector Distribution

Variables	Freq.	Percent (%)
Region		
East	333	11.54
East Midlands of England	226	7.83
London	404	14.00
North East of England	81	2.81
North West of England	273	9.46
Northern Ireland	46	1.59
Scotland	151	5.23
South East of England	514	17.81
South West of England	294	10.19
Wales	112	3.88
West Midlands of England	230	7.97
Yorkshire & Humber	222	7.69
Industry Sector 1-digit		
A – Agriculture, Forestry & Fishing	110	3.81
B, D, E – Mining & Quarrying, Utilities	17	0.59
C – Manufacturing	262	9.08
F – Construction	322	11.16
G - Wholesale & Retail, Repair of Motor Vehicles	448	15.53
H - Transport & Storage	116	4.02
I - Accommodation & Food Service	167	5.79
J - Information & Communication	166	5.75
K - Financial & Insurance Activities	146	5.06
L – Real Estate Activities	69	2.39
M – Professional, Scientific & Technical Services	280	9.71
N - Administrative & Support Services	96	3.33
P – Public Administration & Defence	4	0.14
Q - Education	117	4.06
R – Arts, Entertainment & Recreation	180	6.24
S - Other Services	385	13.34
Total	2,885	

Table A2: Financing Investment models

Dependent Variables:	(1) Firm Cash Reserves		(2) Owner Capital		(3) Trade Credit		(4) Bank Loan		(5) Other Debt Finance		(6) Outside Equity	
	1A	**1B**	**2A**	**2B**	**3A**	**3B**	**4A**	**4B**	**5A**	**5B**	**6A**	**6B**
Key Firm Characteristics												
Size class (base: Micro)												
Small	0.1019*** (0.0200)	0.0877*** (0.0212)	-0.0934*** (0.0257)	-0.0993*** (0.0265)	0.0312* (0.0196)	0.0123 (0.0174)	0.0530* (0.0291)	0.0414 (0.0290)	0.0570*** (0.0244)	0.0415* (0.0231)	0.0231** (0.0127)	0.0181* (0.0119)
Medium	0.0475 (0.0319)	0.0272 (0.0350)	-0.1932*** (0.0216)	-0.1975*** (0.0200)	0.0028 (0.0253)	-0.0116 (0.0210)	0.0035 (0.0380)	-0.0341 (0.0340)	0.0271 (0.0281)	0.0084 (0.0259)	0.0735*** (0.0302)	0.0670*** (0.0286)
Large	0.0695 (0.0662)	0.0433 (0.0764)			0.0344 (0.0732)	0.0244 (0.0712)	0.0228 (0.0835)	-0.0177 (0.0687)	0.2113** (0.1433)	0.1779* (0.1357)	0.0174 (0.0510)	0.0266 (0.0575)
Age Class (base: 0-3)												
4-10	0.0358 (0.0531)	0.0371 (0.0522)	-0.0417 (0.0682)	-0.0455 (0.0686)	0.0011 (0.0465)	0.0077 (0.0452)	0.0491 (0.0760)	0.0526 (0.0772)	0.0833 (0.0885)	0.0850 (0.0874)	-0.0075 (0.0261)	-0.0056 (0.0225)
11-20	0.0409 (0.0518)	0.0537 (0.0504)	-0.0920 (0.0626)	-0.0973 (0.0631)	-0.0103 (0.0413)	0.0008 (0.0400)	0.0336 (0.0656)	0.0510 (0.0676)	0.0923 (0.0730)	0.0946 (0.0729)	0.0067 (0.0328)	0.0088 (0.0295)
>20	0.0927* (0.0562)	0.1013 (0.0565)	-0.1219* (0.0693)	-0.1356 (0.0708)	-0.0239 (0.0437)	-0.0153 (0.0400)	-0.0002 (0.0620)	0.0035 (0.0620)	0.0651 (0.0562)	0.0611 (0.0553)	0.0106 (0.0298)	0.0109 (0.0261)
Firm Risk Scale	-0.0111 (0.0096)	-0.0122 (0.0096)	0.0312*** (0.0119)	0.0263** (0.0121)	0.0171** (0.0073)	0.0160** (0.0069)	0.0212** (0.0102)	0.0158 (0.0102)	0.0102 (0.0080)	0.1466 (0.1282)	0.0096** (0.0041)	0.0091** (0.0038)
Sector (base: A – Agriculture, forestry and fishing)												
Mining & Quarrying, Utilities	-0.0627 (0.0902)	0.0503 (0.1160)	0.0298 (0.0894)	-0.0160 (0.0818)	0.4182*** (0.1754)	0.2048** (0.1235)	0.2598*** (0.1103)	0.5713*** (0.1530)	0.1553* (0.1091)	0.3563*** (0.1812)	0.0019 (0.0266)	-0.0087 (0.0174)
Manufacturing	-0.0763 (0.1949)	0.0371 (0.1221)					-0.1266 (0.0452)		-0.0585 (0.0397)		0.1518 (0.1852)	0.1728* (0.1873)
Construction	-0.0851 (0.0864)	0.0947 (0.0922)	0.0152 (0.0794)	-0.0138 (0.0747)	0.2268** (0.1409)	0.0586 (0.0728)	0.0091 (0.0705)	0.3093** (0.1695)	0.0418 (0.0714)	0.2006* (0.1479)	0.0264 (0.0387)	0.0222 (0.0358)
Wholesale & Retail, Repair of Motor Vehicles	0.0085 (0.0691)	0.0958 (0.0915)	0.0173 (0.0798)	-0.0144 (0.0747)	0.2651*** (0.1419)	0.0873 (0.0779)	0.0288 (0.0749)	0.3120** (0.1641)	0.0954 (0.0835)	0.2797** (0.1560)	-0.0005 (0.0237)	-0.0057 (0.0180)
Transportation & Storage	0.0122 (0.0649)	-0.0125 (0.1591)	0.0123 (0.0750)	-0.0226 (0.0702)	0.1248 (0.1111)	-0.0018 (0.0463)	0.0610 (0.0753)	0.3650*** (0.1617)	-0.0216 (0.0498)	0.0986 (0.1141)	-0.0141 (0.0169)	-0.0085 (0.0170)
Accommodation & Food Service Activities	-0.1478 (0.1156)	0.1014 (0.0808)	0.0462 (0.1038)	0.0186 (0.0995)	0.0811 (0.1210)	-0.0209 (0.0442)	0.0273 (0.0938)	0.3276** (0.1931)	0.2578*** (0.1355)	0.4850*** (0.1889)	0.0501 (0.0585)	0.0238 (0.0428)
Information & Communication	-0.0193 (0.0814)	0.0335 (0.1253)	0.1345 (0.1026)	0.0810 (0.0973)	0.0411 (0.0990)	-0.0142 (0.0509)	0.0534 (0.0879)	0.3719** (0.1816)	0.0852 (0.0930)	0.3001** (0.1792)	-0.0151 (0.0200)	-0.0113 (0.0189)
Financial & Insurance Activities	-0.1108 (0.0968)	0.0887 (0.0847)	0.1073 (0.0955)	0.0805 (0.0905)	0.1163 (0.1212)	0.0086 (0.0552)	0.0470 (0.0823)	0.4088*** (0.1731)	0.0289 (0.0724)	0.2259* (0.1613)	-0.0223 (0.0109)	-0.0151 (0.0128)
Real Estate Activities		0.0483 (0.1198)			0.0780 (0.1197)	-0.0464 (0.0278)		0.3740** (0.1898)		0.1895 (0.1713)		
Professional, Scientific & Technical Services	-0.0720 (0.1075)	0.1104 (0.0733)	0.1124 (0.1135)	0.0798 (0.1107)			0.0610 (0.1016)	0.3838** (0.1928)	0.0148 (0.0775)	0.2107 (0.1805)		
Administrative and support services	0.0235 (0.0650)	0.0943 (0.0828)	0.0023 (0.0774)	-0.0098 (0.0741)	0.1280 (0.1196)	0.0217 (0.0579)	-0.0293 (0.0618)	0.2983** (0.1695)	0.0371 (0.0688)	0.2297** (0.1542)	-0.0123 (0.0178)	-0.0060 (0.0185)
Public Administration and defence	0.0090 (0.0844)		-0.0304 (0.0890)	-0.0378 (0.0849)	-0.0052 (0.0656)	-0.0477 (0.0232)	-0.0205 (0.0810)	0.3244* (0.1974)	-0.0334 (0.0517)	0.1120 (0.1445)		
Education	-0.1160 (0.1152)	0.0376 (0.1263)										
Arts & Entertainment and recreation	-0.0112 (0.0747)	0.0914 (0.0880)	0.0843 (0.1188)	0.0583 (0.1164)	0.0147 (0.0856)	-0.0393 (0.0327)	0.0292 (0.0963)	0.3757** (0.1907)	-0.0549 (0.0321)	0.0671 (0.1124)		

Other Services	-0.0893 (0.0826)	0.0431 (0.1219)	0.0566 (0.0884)	0.0108 (0.0812)	0.0765 (0.1040)	-0.0151 (0.0438)	0.0151 (0.0758)	0.3003** (0.1749)	0.0756 (0.0832)	0.2715** (0.1652)	-0.0173 (0.0149)	-0.0145 (0.0139)
Region (base: East of England)												
East Midlands of England	-0.0053 (0.0512)	-0.0063 (0.0517)	-0.0237 (0.0578)	-0.0246 (0.0573)	-0.0573** (0.0179)	-0.0529** (0.0165)	0.0049 (0.0557)	0.0141 (0.0569)	0.0236 (0.0459)	0.0145 (0.0438)	0.0157 (0.0276)	0.0153 (0.0251)
London	-0.0196 (0.0496)	-0.0131 (0.0491)	0.0790 (0.0612)	0.0693 (0.0611)	0.0192 (0.0361)	0.0218 (0.0353)	0.0400 (0.0554)	0.0392 (0.0547)	0.0631 (0.0503)	0.0598 (0.0488)	0.0517 (0.0395)	0.0575** (0.0402)
North East of England	0.0069 (0.0751)	-0.0039 (0.0766)	-0.0462 (0.0738)	-0.0585 (0.0703)	-0.0382 (0.0310)	-0.0381 (0.0280)	0.0107 (0.0754)	-0.0020 (0.0750)	-0.0301 (0.0508)	-0.0390 (0.0406)	0.0667 (0.0764)	0.0691 (0.0765)
North West of England	0.0503 (0.0410)	0.0464 (0.0415)	-0.0339 (0.0545)	-0.0400 (0.0533)	0.0054 (0.0348)	-0.0001 (0.0311)	0.0656 (0.0594)	0.0569 (0.0572)	-0.0104 (0.0386)	-0.0192 (0.0348)	0.0239 (0.0325)	0.0270 (0.0320)
Northern Ireland	-0.1609 (0.1265)	-0.1417 (0.1190)	-0.1180 (0.0794)	-0.1259 (0.0789)	-0.0558 (0.0214)	-0.0539* (0.0173)	-0.0284 (0.0949)	-0.0172 (0.1038)	0.0771 (0.1120)	0.0725 (0.1123)	0.0907* (0.0858)	0.1098** (0.0924)
Scotland	0.0091 (0.0594)	0.0012 (0.0601)	-0.0166 (0.0696)	-0.0181 (0.0693)	-0.0091 (0.0274)	-0.0050 (0.0263)	0.0788 (0.0736)	0.0779 (0.0732)	0.0163 (0.0568)	0.0152 (0.0559)	0.0276 (0.0459)	0.0239 (0.0408)
South East of England	-0.0078 (0.0440)	-0.0060 (0.0433)	-0.0028 (0.0515)	-0.0067 (0.0511)	-0.0315 (0.0248)	-0.0271 (0.0234)	0.0054 (0.0477)	0.0061 (0.0467)	0.0320 (0.0396)	0.0284 (0.0389)	0.0242 (0.0276)	0.0259 (0.0267)
South West of England	-0.0215 (0.0495)	-0.0099 (0.0469)	-0.0285 (0.0532)	-0.0368 (0.0519)	0.0014 (0.0472)	-0.0059 (0.0408)	0.0021 (0.0516)	0.0090 (0.0526)	-0.0155 (0.0354)	-0.0201 (0.0330)	0.0291 (0.0296)	0.0304 (0.0286)
Wales	-0.1129 (0.0840)	-0.1205* (0.0845)	0.0607 (0.0843)	0.0700 (0.0857)	-0.0077 (0.0326)	-0.0143 (0.0282)	0.0033 (0.0731)	0.0118 (0.0742)	0.0651 (0.0698)	0.0516 (0.0643)	0.0422 (0.0499)	0.0416 (0.0464)
West Midlands of England	0.0721 (0.0406)	0.0664 (0.0413)	0.0284 (0.0627)	0.0166 (0.0624)	0.0064 (0.0366)	-0.0005 (0.0323)	0.0363 (0.0591)	0.0311 (0.0578)	0.0597 (0.0529)	0.0467 (0.0501)	-0.0052 (0.0189)	-0.0014 (0.0182)
Yorkshire & Humber	0.0252 (0.0497)	0.0194 (0.0502)	-0.0255 (0.0599)	-0.0291 (0.0587)			0.0642 (0.0638)	0.0552 (0.0635)	0.0400 (0.0494)	0.0346 (0.0471)	-0.0258* (0.0084)	-0.0220 (0.0079)
Investment Type												
Land and Building		0.0132 (0.0327)		0.1277*** (0.0474)		-0.0006 (0.0218)		0.1633*** (0.0452)		0.0173 (0.0281)		0.0083 (0.0143)
Plant, Machinery and Vehicles		0.0756*** (0.0260)		0.0087 (0.0304)		0.0625*** (0.0169)		0.0660*** (0.0254)		0.0477** (0.0197)		0.0091 (0.0090)
Process Innovation		0.0139 (0.0270)		0.0051 (0.0326)		0.0245 (0.0174)		0.0531* (0.0294)		-0.0084 (0.0208)		-0.0071 (0.0071)
IT		0.0703*** (0.0269)		-0.0162 (0.0315)		0.0260 (0.0197)		0.0154 (0.0267)		-0.0030 (0.0203)		-0.0158* (0.0097)
Market Development		-0.0175 (0.0278)		0.1109*** (0.0350)		0.0099 (0.0177)		0.0440 (0.0285)		0.0516** (0.0247)		-0.0182** (0.0066)
Product/Service Innovation		0.0037 (0.0248)		-0.0023 (0.0303)		0.0036 (0.0174)		-0.0177 (0.0266)		0.0081 (0.0199)		0.0167* (0.0105)
Training		-0.0008 (0.0370)		0.0467 (0.0476)		-0.0094 (0.0233)		0.0747* (0.0451)		0.0111 (0.0293)		-0.0085 (0.0111)
No. obs	1,375	1,375	1,334	1,334	1,342	1,342	1,375	1,375	1,375	1,334	1,204	1,204
Model significance	0.0119	0.0019	0.0000	0.0000	0.0000	0.0000	0.0409	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.0565	0.0749	0.0468	0.0656	0.0932	0.1258	0.0424	0.0706	0.0675	0.0656	0.1066	0.1394

Note: *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level. Figures in parentheses are standard errors. The dependent variables are dummy variables indicating whether a firm has used a certain source of finance to finance their investment. The coefficients in the table show the marginal effect.

Table A3: Probit Models of Complementary and Substitute Sources of Finance: Marginal Effects

Finance Source	Retained Earnings	Owner Funds	Trade Credit	Bank Debt	Non-Bank Debt	External Equity
Retained Earnings	N/A	-22.92%***	-4.21**	-13.28***	0	-6.10%***
Owner Funds	-16.86%***	N/A	+4.90***	+6.30%**	+7.48%***	0
Trade Credit	-8.01*	+13.61***	N/A	+19.81%***	+5.96**	0
Bank Debt	-12.62***	+7.99%***	+9.80***	N/A	0	0
Non-Bank Debt	0	+14.09%***	+4.57**	0	N/A	0
External Equity	-32.46***	0	0	-8.98%*	0	N/A
+ Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
+ Investment Types	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	1,375	1,334	1,342	1,375	1,375	1,204
Significance	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Pseudo R2	0.1708	0.1190	0.2042	0.1330	0.1217	0.2296

Note: *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level. 0 indicates no significant effect. Building on the estimation models in Table A2 columns 1B, 2B, 3B, 4B, 5B and 6B, we added the other finance source to investigate whether there is complementary or substitute effect between each pair of sources of finance. The table shows the marginal effect from those probit models.

Table A4: Investment models

Dependent Variables:	Land and Building	Plant, Machinery and Vehicles	Process Innovation	IT	Market Development	Product/Service Innovation	Training
				Active Investment = 1			1
Finance Source							
Retained Earnings	0.3904* (0.0209)	0.1689*** (0.0480)	0.0292 (0.0348)	0.1302*** (0.0474)	0.0574 (0.0362)	0.0081 (0.0393)	0.0792* (0.0461)
Owner Funds	0.0727*** (0.0276)	-0.0202 (0.0434)	0.0766** (0.0351)	-0.0102 (0.0413)	0.0206 (0.0345)	0.0949*** (0.0370)	0.0055 (0.0411)
Trade Credit	-0.0362 (0.0240)	0.1941*** (0.0568)	0.0348 (0.0493)	0.1202** (0.0537)	0.1059** (0.0541)	0.0042 (0.0469)	0.0838 (0.0585)
Bank Debt	0.1022*** (0.0313)	0.0737 (0.0443)	0.1031*** (0.0375)	0.0354 (0.0438)	0.0616* (0.0383)	0.0383 (0.0385)	0.0118 (0.0441)
Non-Bank Debt	-0.0076 (0.0262)	0.1054* (0.0545)	0.0178 (0.0467)	0.0021 (0.0560)	-0.0033 (0.0473)	0.0908* (0.0497)	0.0447 (0.0548)
External Equity	0.0558 (0.0590)	0.1521* (0.0833)	0.1118 (0.0836)	-0.1080 (0.0942)	-0.0932 (0.0549)	-0.1432** (0.0464)	0.0868 (0.0855)
No. obs	1,375	1,375	1,377	1,368	1,375	1,375	1,377
Firm Characteristics	YES	YES	YES	YES	YES	YES	YES
Sector Controls	YES	YES	YES	YES	YES	YES	YES
Region Controls	YES	YES	YES	YES	YES	YES	YES
Model significance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.1323	0.1523	0.0692	0.1143	0.0654	0.0657	0.0657

Note: *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level. Figures in parentheses are standard errors. The dependent variables are dummy variables indicating whether a firm have actively invested in each type of investment. The independent variables are the source of finances use to fund the investment with key firm characteristics, sector controls and region controls. The coefficients in the table show the marginal effect.