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RESEARCH REPORT

Estimating Underinvestment in the UK Business Sector

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Foreword

UK gross capital formation as a share of GDP in the last fifty years peaked in 1974 at 27.76% and notwithstanding some individual years, such as 1989 when it reached 26.08%, it has been on a downward trend and in the latest reported year of 2025 stood at only 20.00[1]. This lack of investment has been blamed for the equally low rate of productivity growth that the UK has experienced since 2008 (Mason, O'Mahony, and Riley, 2018), together with issues such as skills deficiencies (Keep and Mayhew, 2014) and low innovation rates which Horbach and Rammer (2022) explicitly link. In respect of investment itself, which has been particularly low since the Global Financial Crisis (GFC) period, the so called lost decade, attention has focused on heightened levels of exogenous uncertainty, the culmination of the GFC, the Brexit vote, actual Brexit, and Covid-19 (Mann, 2024; Alayande and Coyle, 2023), but also short-termism in capital markets in the form of underweighting and excessive discounting of expected returns, and short-termism in the form of investor myopia (Juniper, 2000), although Cowling and Wilson (2024) find evidence that in many cases this is driven by the firm's strategic choices that limits new investment to those with short payback periods. All these explanations of low investment and low productivity growth implicitly (or sometimes explicitly) assume that new opportunities for investment are widely available and that firms simply face insurmountable barriers to making these investments.

[1] https://data.worldbank.org/indicator/NE.GDI.TOTL.ZS?locations=GB

How We Address the Estimation of UK Business Sector Underinvestment

It remains the case that whilst we know that UK business sector investment at the aggregate level is lower than many of our competitors, for example for 2022 UK Gross Fixed Capital Formation out of GDP was 18.3%, for France 25.2%, Germany 22.1%, Japan 26.0%, and for the US 21.3%, we know much less about the scale of underinvestment, how it varies across different types of firms, and what is driving it, and more specifically how firms' strategic choices impact it. This research project will directly address these issues using three separate, but related strands of analysis as follows:

- **The Investment Opportunity - Actuation Method** - This method firstly considers whether a firm has identified a new opportunity for investment per se. Only then, if a firm has identified a new opportunity, do we consider whether the firm acts on that opportunity, and at what financial scale (the cash amount of investment). From this, we can then calculate the net additional cash volume of investment that would be predicted if all new opportunities were invested in at the same scale. This is the underinvestment gap.

- **The Debt Aversion Method** - This method considers the impact of firms' aversion to taking on external debt on their probability of investing, even when the firm is willing to accept the consequence of slower growth, and how much this debt aversion might reduce their scale of investment. This considers the large and consistent body of empirical evidence, particularly relating to smaller firms, that their first-best financing strategy is to fund all their operational and investment requirements from internal capital reserves. In this sense, the debt aversion method calculates the investment consequences of self-exclusion from the debt market.

- **The Ex-Post Underinvestment Method** - This method relies on firms' ex post judgement of whether, given the investments they made, of whether they (a) underinvested, (b) invested the right amount, or (c) overinvested. Here the focus is on the firms that stated that they had underinvested and the differences had they invested at a higher level.

This method involves self-evaluation of past investment performance, but it doesn't require owners or business decision-makers to comment on whether they were taking an appropriate level of risk when they took prior investment decisions. So, to the extent that some decision-makers will not have retracted their assessment of the appropriate level of risk they should have taken in the past, this measure of under-investment may still under-estimate the extent of the problem - if firms continue to be satisfied with certain risk-averse behaviours and decision e.g. self-exclusion from lending markets.

Using these three alternative methods for estimating the scale of UK business sector underinvestment, we can calculate the aggregate levels but also the relative levels according to:

- Firm Size Class (Micro, Small, Medium and Large)

- Firm Age Class (0-3, 4-10, 11-20, and 21 years plus)

- Industry Sector (16 SIC 1-digit industry sectors)

- Standard Geographical Region (12 regions)

These are all factors that have been shown in previous studies to impact on all aspects of financing and investment at the firm level. In doing so, we will be able to provide a more comprehensive,

detailed, and nuanced picture of the scale of UK business sector underinvestment and where it is most apparent.

The Data

The data is drawn from a bespoke finance and investment decision making survey of 2,886 UK firms conducted in 2023. It was a collaboration between the Department for Business and Trade and the Bank of England. The survey provided detailed information at the firm level on:

- The identification of new opportunities for investment
- The activation of new investment opportunities conditional upon them being identified
- How firms financed their investments
- The total value in cash terms of investments
- Barriers to investment

Types of investments considered were in the following broad categories: Land and buildings; Plant, machinery and vehicles; IT; Market development; Product or service innovation; Training; Process innovation; Other

Investments refer to those made in the last three years which would cover the financial years 2020-2021 through to 2022-2023. A survey weighting was applied to the data based on the known UK business population in 2024 and we use the actual population statistics to calculate the actual cash volumes of underinvestment by standard geographic regions, firm size classes, standard 1 digit SIC codes, and age classes.

It was clearly the case that the beginning year that we consider was within the Covid-19 pandemic period and this means that levels of firm borrowing, supported by the special pandemic public loan guarantee schemes, was higher than normal. In the later pandemic period, when local lockdowns also occurred, firms within these local areas may have faced additional problems impacting their liquidity. In a broader sense, the nature of the separation between key industries and unprotected sectors will also have influenced their trading incomes, demand for finance, and investment opportunities and ability to invest.

The Report Author

Professor Marc Cowling has a PhD in Business Economics from Warwick Business School and an MSc Economics from London University. He is currently ranked in the top 5% of economists in the world by citations (H-index) according to Research Publications in Economics (REPEC, February 6th, 2026), and he was ranked in the Top 2% of Research Scientists in the world in 2025 according to Stanford list. He has published over 100 academic journal articles and reports for national and supra-national governments and agencies in relation to SME finance. His main research interests are small business survival and growth, financing and investment. He is Professor of Economics and Productivity at Oxford Brookes Business School in the UK.

Research Packages

RP1 – The Investment Opportunity – Actuation Method

This method has several sequential steps to derive estimates for the potential cash scale of underinvestment by UK firms. The steps include:

- Whether or not a firm has positively identified a new opportunity for investment (in the last three years defined as 2020-21 to 2022-23).
- Conditional upon a firm having identified a new opportunity for investment (in the last three years), did it make an investment (or not). We are obviously interested specifically in those firms that identified a new opportunity but did not actually invest.
- We then use the parameters (lower and upper bounds) of known actual investments (in the last three years) to calculate the cash value of potential missing investments by using the actual UK business population estimates for 2024. Then we calculate the midpoint in the ranges.
- We estimate that in aggregate 46.14% of UK employer firms (658,494 employer firms) had identified a new investment opportunity and that of those new opportunities identified 93.55% (616,021 employer firms) had made an investment.
- In total, we estimate that between 6.45% (42,220 and 44,300) UK employer firms had not invested in any new opportunities that they had identified.
- The average scale of investments made were between £20,000 and £50,000.
- Our estimates of the aggregate total cash volume of uninvested new opportunities (using the midpoint of the range) is £1.924bn.

Table 1: Uninvested New Investment Opportunities Gap

Lower Estimate £bn	Upper Estimate £bn	Midpoint Estimate £bn
1.275	2.572	1.924

If net investment rates, defined by opportunity identification and actuation of an investment, rose to 50.00% from their current level of 43.18% (opportunity rate*actuation rate) in terms of the share of the business population that have made an investment, then this would unlock an additional £1.924bn (with a range of £1.97bn to £4.93bn) in investment in the economy.
This additional investment would create total net returns of between £180m and £451m for firms over and above the invested capital using the lower and upper bounds for known average investment returns to investments between 2020-21 to 2022-23 from the survey data.

RP2 – The Debt Aversion Method

This method considers the impact of firms' aversion to taking on external debt on their probability of investing, even when the firm is willing to accept the consequence of aversion to borrowing in terms of less investment and slower growth, and how much this debt aversion might reduce their scale of investment. This considers the large and consistent body of empirical evidence, particularly relating

to smaller firms, that their first-best financing strategy is to fund all their operational and investment requirements from internal capital reserves. In this sense, the debt aversion method calculates the investment consequences of self-exclusion from the debt market. This is rooted in a classic literature of control aversion (Cressy, 1995). More generally, it can be considered within firms' financial pecking order (Myers, 1984) and financial life-cycle theories (Berger and Udell, 1998) where internal reserves are preferred to market finance. For our purposes, we draw upon a specific survey question: “as a business, we will accept a slower growth rate rather than borrowing to grow faster”? This question is expressed on a 5-point Likert scale where 1=strongly disagree and 5= strongly agree. We then create a binary variable where firms that reported that they agree or strongly agree with the statement are coded as 1 and firms that reported all levels of agreement below 4 on the Likert scale are coded as 0.

This dummy, no borrow slow growth, variable shows that 74.74% (standard deviation = 0.43) of UK firms fell into the no borrow slow growth category which highlights the strength of debt aversion present amongst the UK firm population. The difference in the actual cash volume of investments shows that no borrow slow growth firms average total investments were £18,050 per firm. This is calculated from known cash investments for both types of firms. We use these total cash investment differences as the basis for our estimates of underinvestment using this debt aversion method:

- In total, 1,079,495 firms would rather grow more slowly than borrow.
- The total investment gap is £19.48bn with an average gap of £18,050 per firm, calculated by multiplying the number of firms that would rather grow more slowly than borrow and the average investment gap.
- If this investment gap were removed, this would generate total net returns to firms that have transitioned into being more tolerant of borrowing to grow, amounting to £1.62bn using reported average returns on investments over the years 2020-21 to 2022-23.

This could be construed as estimates of the aggregate self-imposed debt - investment gap by firms. One of the reasons why this gap comes out so much smaller than the other methods is that it only covers one stage of the decision-making process that leads to under-investment.

RP3 – The Ex-Post Underinvestment Method

This method relies on firms' *ex post* judgement of whether, given the investments they made, of whether they (a) underinvested, (b) invested the right amount, or (c) overinvested. Here the focus is on the firms that stated that they had underinvested and the differences had they invested at a higher level. We create a binary variable which is coded 1 for firms that responded “No – invested too little” to the survey question: Do you feel that your business has made the appropriate level of investment over the past 3 years? All other firm responses to this question were coded as zero.

This dummy, too little investment, variable shows that 22.16% (standard deviation = 0.42) of UK firms fell into the too little investment category which highlights the prevalence of underinvestment amongst the UK firm population. We then use this total cash investment to calculate the cash differences if these set of firms had invested 5%, 10%, or 20% more than they did as the basis for our estimates of underinvestment using this underinvestment method. So, for example, if a firm that made the appropriate level of investment invested £50,000 and a firm that considered it had underinvested had invested £30,000 then the gap would be £20,000. The use of three different scenarios, a 5%, 10% and 20% increase in investment, is aimed at creating realistic and feasible scenarios rather than predicting a utopian world where all underinvesting firms suddenly adopt the investment behaviours of those firms that were happy with their level of investment.

Key Insight

- *We find that between 310,291 and 317,102 firms had underinvested.*
- *The main difference driving the underinvestment is not the new investment opportunity identification rate which is 48.38% of firms compared to 45.82% of firms that invested at the appropriate level, but the activation rate given their investment opportunities which was 84.98% for underinvested firms and 96.22% for firms that invested at the appropriate level.*

The total cash volume of underinvestment is estimated to be:

Table 2: Too Little Investment Firms if they Increased their Investment Rate

	+5% Investment Effect £bn	+10% Investment Effect £bn	+20% Investment Effect £bn
Total Assuming:	0.763	1.526	3.052

Spotlight on UK Regions

Here, we focus on the low- and high-end regions in each of the distributions to highlight the most important differences between UK regions.

- Using the investment opportunity actuation method, we find that only 38.00% of firms in London had identified an investment opportunity and the actuation rate was 90.40% leading to a net investment rate of 34.35%. The investment actuation gap amounts to 9,359 firms and between £467.9m and £701.9m.

- Using the debt aversion method, we find that 80.12% of firms in Wales are debt averse as are 79.47% of firms in Yorkshire and The Humber. This amounts to 44,635 and 83,944 firms respectively and the missing potential investments are £2.58bn and £660m respectively.

- Using the ex-post underinvestment method, we find that firms in 31.68% of firms in Wales had underinvested. The level of investment over the three years to 2023 was £615.6m and if firms increased their investment by 5%, 10% or 20% this would lead to an increase in investment of £30.8m, £61.6m, and £123.1m respectively. We also find that 27.69% of firms in London had underinvested and that their level of investment over the three years to 2023 was £4.7bn and if firms increased their investment by 5%, 10% or 20% this would lead to an increase in investment of £235.9m, £471.9m, and £943.7m respectively.

Spotlight on Firm Size Classes

- Using the investment opportunity actuation method, we find that only 42.96% of micro firms had identified an investment opportunity and 93.06% had activated an investment leading to a net investment rate of 39.98%. The investment actuation gap amounts to 34,622 firms and a midpoint estimate of £1.2bn.

- Using the debt aversion method, we find that 76.49% of micro firms were debt averse and this amounts to 888,252 firms and potential underinvestment of £13.3bn.

- Using the ex-post underinvestment method, we find that 24.41% of medium-sized firms had underinvested over the three years to 2023 given their actual investment of £4.3bn and that if they increase their investment rate by 5%, 10% or 20% this would lead to an increase in investment of £213.3m, £426.7m, and £853.4m respectively.

Spotlight on Industry Sectors

- Using the investment opportunity actuation method, we find that only 34.99% of financial services firms had identified an investment opportunity and 94.78% had activated an investment leading to a net investment rate of 33.16%. The investment actuation gap amounts to 444 firms and between £4.4m and £8.9m. The largest actual investment gap at the midpoint is £421.7m in the hospitality sector.

- Using the debt aversion method, we find that 79.40% of construction firms were debt averse and this amounts to 154,077 firms and potential underinvestment of £2.9bn. We also find that 82.07% of firms in transportation and storage were debt averse and this amounts to 38,044 firms and potential underinvestment of £660.3m.

- Using the ex-post underinvestment method, we find that 31.54% of real estate firms had underinvested over the three years to 2023 given their actual investment of £1.1bn and that if they increase their investment rate by 5%, 10% or 20% this would lead to an increase in investment of £57.2m, £114.5m, and £229.0m respectively. We also find that 28.65% of information and communications firms had underinvested over the three years to 2023 given their actual investment of £427.3m and that if they increase their investment rate by 5%, 10% or 20% this would lead to an increase in investment of £21.4m, £42.7m, and £85.46m respectively.

Spotlight on Firm Age Classes

- Using the investment opportunity actuation method, we find that only 42.50% of 11-20 years old firms had identified an investment opportunity and 95.02% had activated an investment leading to a net investment rate of 40.38%. The investment actuation gap amounts to 10,050 firms and a midpoint estimate of £351.8m.

- Using the debt aversion method, we find that 85.70% of 0-3 years old firms were debt averse and this amounts to 44,643 firms and potential underinvestment of £1.7bn.

- Using the ex-post underinvestment method, we find that 25.31% of 4-10 years old firms had underinvested over the three years to 2023 given their actual investment of £1.0bn and that if they increase their investment rate by 5%, 10% or 20% this would lead to an increase in investment of £52.1m, £104.2m, and £208.5m respectively.

Summary

We set out to estimate the prevalence and scale of underinvestment amongst the UK (employer) business population over the period 2020-21 to 2022-23 using data from a unique firm level business and investment survey. We adopted three separate methods to identify underinvestment including:

- The Investment Opportunity - Actuation Method
- The Debt Aversion Method
- The Ex-Post Underinvestment Method

Each method generated different estimates of (a) how many firms had underinvested, and (b) the cash volume of underinvestment. Table 4 shows the numbers of firms in the UK business population that were estimated to have underinvested using each of the three methods.

Table 4: Estimated Numbers of Underinvested Firms

	Investment Actuation	**No Borrow Slow Growth**	**Underinvestment**
Average Number of Firms	42,917	1,064,579	315,191

From Table 4, we observe that the lowest estimates relate to firms not activating on an identified new investment opportunity which amounts to 42,917. Firms that exhibit debt aversion and would rather grow more slowly than raise debt generate estimates of between 1,064,579 and we estimate that there were 315,191 firms who were underinvested. This suggests that the strong prevalence of debt aversion in the UK business population represents a major barrier to investment and limits firm's willingness to invest *per se*, but also the scale of any investments that they do make. The lowest estimates of underinvestment relate to firms' who identified an investment opportunity but did not proceed with it. It is likely that those that under-invest also implicitly regret how they assessed whether there were opportunities to invest in the first place.

So where does this leave us in terms of the potential options to reduce this level of underinvestment in the UK economy? In terms of the numbers of firms that are underinvested, this would broadly equate to similar numbers of firms supported via the post-Covid-19 UK loan guarantee scheme, the Recovery Loan Scheme, over the same time window. But if a firm holds a strong degree of debt aversion to the extent that it is willing to accept a slower growth rate then this would require a major shift in incentives and behaviour in the first instance.

The focus of any policy (and lending institutions) attention to reduce the prevalence of debt aversion and hence stimulate more investment at the regional level would be in Wales where 80.12% of firms are debt averse, Yorkshire and the Humber, 79.47%, and the West Midlands, 77.34%. Across firm size classes, debt aversion is particularly extreme amongst micro firms (<10 employees) where 76.49% are debt averse. As micro firms are the most prevalent size class of firms in the UK, even a small shift in debt aversion would generate a large investment effect. Additional dynamic effects that would accrue, because of more competition and innovation from micro firms that invest and grow. There are also some industry sectors that might be the focus of attention, and these include the transport and storage sector where 82.07% of firms are debt averse and the construction sector where 79.40% of firms are debt averse. The construction industry may need particular attention given the uplift in the house building targets announced recently.

In terms of that key first step in the investment process, that of identifying a new opportunity, our evidence shows that this is particularly low in London where only 38.00% of firms identified a new investment opportunity and the East of England where only 42.98% of firms did. Low rates of new investment opportunity identification are also apparent for micro firms where 42.96% identified a new

opportunity, and in the financial services and wholesale and retail sectors where only 34.99% and 37.05% of firms respectively identified new investment opportunities. It is also the case that the large body of well-established firms (over 10 years since foundation) in the UK economy appear to have lost their dynamism as the rate of new investment opportunity is way below that of younger firms. Without identifying a new investment opportunity in the first instance, no investment is likely to occur. In this sense, UK firms appear to be lacking in entrepreneurial spirit as a key role for entrepreneurs and senior managers is to scan the external environment for new opportunities to invest in activities that facilitate firm growth and efficiency.

Our ex-post underinvest estimates are important as it reflects firms' views that they had new investment opportunities that the firm believed they ought to have invested in but at the time did not do so. This might imply that they passed the firm's appraisal process but remained uninvested. The scale of firm level underinvestment in terms of acting on identified new investment opportunities is greatest in Scotland where underinvested firms had activation rates that were 23.39% lower than firms that made the appropriate level of investment, and in London where the respective figure was -20.69% for activation rates. Large relative and negative activation rates for identified new investment opportunities were also evident amongst micro and small firms (-11.17% and -10.05%) and in the financial services and agriculture, forestry and fishing sectors where the relative deficits were -37.35% and -35.29%. It was also the case that younger firms (less than 11 years since founding) had larger deficits in investment activation than older firms.

Finally, we set out our combined estimates for aggregate underinvestment across our three alternative methods using the average estimates for regions, firm size classes, industry sectors and firm age classes. These are presented in Table 5 below.

Table 5: Estimates of the Cash Volume of Underinvestment

	Investment Actuation	**No Borrow Slow Growth**	**Underinvestment**
Midpoint Estimate £bn	1.924	16.535	2.289
Lower Bound £bn	1.125	13.664	0.730
Upper Bound £bn	2.771	19.405	3.433

Table 5 reports the aggregate cash scale midpoint estimates of UK firm underinvestment for each of our three methods and the lower and upper bounds of our estimates. Taking the midpoints, we estimate that underinvestment in the UK is between £1.95bn (due to not activating investment opportunities) and £16.54bn (due to self-imposed borrowing constraints). This would equate to between 12.58% and 106.71% of the total of venture capital raised in the UK in 2024 which was

£15.5bn[2] and between 3.15% and 26.66% of total new lending to businesses in the UK in 2024 which was £62bn[3].

In this sense, whilst the aggregate cash volume of estimated underinvestment is between £1.95bn and £16.54bn is comparable with at the maximum increase in bank lending of 26.66%, the total number of firms that are underinvested using the investment actuation method is comparable with the scope of the larger public loan guarantee schemes, and in the wider context of capital markets it represents quite modest increases in their total lending and investment volumes. This is not the case using our no borrow-slow growth method which characterises large swathes of the business population of the UK.

To reduce the investment gap, several issues need to be addressed before conventional public policy instruments and capital markets can get engaged. Firstly, more firms need to weaken their debt aversion and open themselves up to taking on debt to fund new investment. This may require a concerted public and financial institution campaign, or maybe engagement with networks of financial advisors to promote the benefits of raising debt (and other forms of external capital) to fund new investment. On the supply-side of capital markets, an argument could be made that lenders and banks in particular could feel able to take more risks by lending to more and a broader range of businesses, and to be able to support viable businesses with finance through thick and thin, and that the system of UK bank and financial regulation needs to encourage lenders to take much more of a pro-investment, pro-growth approach, which would be in line with the BoE's current MPC and FPC mandates, the Chancellor's requests to the PRA and the FCA and other regulators to adopt more of a pro-growth objective as well as the Government's; Industrial Strategy, which also calls for this.

We focus on debt because there is new evidence that even debt averse firms relaxed their aversion when faced with the severity of the Covid-19 pandemic and sought out new loans supported by the suite of UK pandemic period loan guarantee schemes. Even after the pandemic, the Recovery Loan Scheme (RLS) reported high take-up of which a significant share of total loans and lending were to support growth investments (Cowling, Brown, Liu, and Yang, 2025). We are a little more wary of any potential equity solution as UK firms typically have an even stronger aversion to external equity as it entails a more explicit and direct loss of control. Recent UK evidence highlights the fact that 93.64% of firms had never used external equity and that in 2023 only 2.39% of firms were using external equity to finance their businesses. In contrast, 54.99% of UK firms were holding debt (Cowling and Yang, 2025) using data from this survey.

But perhaps the greatest issue is that only 46.14% of the total UK business population had identified an opportunity for new investment. Thus, 768,671 firms in the UK population of 1,427,165 firms did not even identify a new opportunity to make an investment. This hints at a leadership deficit in terms of the ability of entrepreneurs and senior managers to seek out new opportunities to invest and grow their businesses and make them more productive, although, as we have already highlighted this is often a strategic choice by firms who restrict their investment to levels that can be funded exclusively from internal cash reserves. This is particularly problematic for many UK firms given that they tend to hold very modest cash reserves that on average equate to 2-3 months of trading income per annum (Cowling Brown, and Rocha, 2020). In mitigation, this reluctance to invest may also relate to wider economic and political uncertainty that has characterised the UK since the Brexit vote in June 2016, including the Covid-19 pandemic, actual Brexit, six Prime Minister’s, three General Elections, the Russian invasion of Ukraine, and wider conflict in the Middle East, not to forget fourteen separate increases in the Bank of England base rate between November 2021 and July 2023. Today we also face the prospect of US tariffs on UK goods and services.

[2] https://dwfgroup.com/en/news-and-insights/insights/2025/11/uk-venture-capital-in-2024-2025-trends-challenges-and-opportunities#:~:text=Early%2Dstage%20investment%20continues%20to,focus%20on%20growth%2Dstage%20opportunities.

[3] https://www.ukfinance.org.uk/news-and-insight/press-release/gross-lending-smes-in-2024

What is also clear is that this observed level of underinvestment by UK firms is not only detrimental to the UK economy in a broad sense, but also to large numbers of firms in terms of potential profits foregone. We estimate that firms are potentially missing out on net profits of between £87m and £347m if they increased their investment rates by 5% or 20% respectively from their current levels and by up to £1.62bn if they relaxed their strong aversion to using debt to grow their firms more quickly. This has the potential to create a virtuous circle of investment to profit which can then be used to fund further investment, some of which would be productivity enhancing.

In terms of the economic implications of these three estimates, each of the three has a different purpose in improving our understanding of under-investment e.g. the actuation method perhaps is more about analysing the types of investment opportunity. The ex-post evaluation method of under-investment is a baseline for regret but doesn't seek to assess the level of risk aversion of business decision-makers whereas the debt aversion method implicitly includes an element of excessive risk aversion over and above a level of risk aversion which could be considered rational.

Next Steps

In terms of future research that will add to our current understanding of the scale and nature of underinvestment in the UK business sector, we will use the new 2025 wave of the business investment and decision making survey to assess whether 1) investment behaviour reacts to the recognition that decisions were incorrect in the past, and 2) the extent that excessive risk aversion is being priced into business decisions - even when firms report that they invested the right amount with the benefit of hindsight. In doing so, we can identify whether firms have learned from prior experience where they have underinvested and corrected for this by increasing their investment rate. We can also examine how firms' willingness to tolerate risk when investing has shaped not only the scale of investments they make, but the types of investments they make with a particular emphasis on growth enhancing investments such as those in transformational innovation.

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Appendix: Detailed Tables

Investment Opportunity - Actuation Method

Region	Firm Investment Opportunities %	Acted on Opportunity %	Net Investment Rates %	No. Firms Under-Invested	£ of missing investments Low Estimate	£ of missing investments High Estimate
East England	42.98	94.80	40.75	3,151	157,542,336	236,313,504
East Midlands	47.10	95.10	44.79	2,245	44,901,616	112,254,040
London	38.00	90.40	34.35	9,359	467,925,686	701,888,529
North East	48.22	95.50	46.05	894	17,881,156	44,702,891
North West	47.93	94.20	45.15	4,006	80,125,313	200,313,282
Northern Ireland	49.99	100.00	49.99	0	0	0
Scotland	49.28	92.00	45.34	3,751	75,012,818	187,532,044
South East	45.69	92.30	42.17	7,307	146,149,259	365,373,148
South West	51.41	94.80	48.74	3,351	67,011,431	167,528,577
Wales	47.63	93.90	44.72	1,619	32,372,650	80,931,624
West Midlands	51.80	95.20	49.31	2,933	146,631,611	219,947,416
Yorkshire and Humber	47.59	91.90	43.74	4,072	81,436,170	203,590,425
Total				**42,687**	**1,316,990,046**	**2,520,375,481**

Firm Size Class	Firm Investment Opportunities %	Acted on Opportunity %	Net Investment Rates %	No. Firms Under-Invested	£ of missing investments Low Estimate	£ of missing investments High Estimate
Micro	42.96	93.06	39.98	34,622	692,444,668	1,731,111,671
Small	64.20	95.08	61.04	6,946	347,292,468	520,938,702
Medium	79.11	97.66	77.26	852	85,154,004	425,770,020
Total				**42,420**	**1,124,891,140**	**2,677,820,393**

Industry	Firm Investment Opportunities %	Acted on Opportunity %	Net Investment Rates %	No. Firms Under-Invested	£ of missing investments Low Estimate	£ of missing investments High Estimate
A Agriculture, Forestry and Fishing	60.45	96.19	58.15	1,182	88,617,330	118,156,440

B,D,E Mining and Quarrying, Utilities	42.32	100.00	42.32	0	0	0
C Manufacturing	51.32	97.74	50.16	1,005	50,237,285	75,355,928
F Construction	41.36	95.29	39.41	3,780	189,011,356	283,517,034
G Wholesale and Retail Trade	37.05	93.01	34.46	6,340	126,803,371	317,008,428
H Transportation and Storage	43.32	94.33	40.86	1,152	57,618,879	86,428,318
I Accommodation and Food Service Activities	57.21	85.33	48.82	12,048	240,950,749	602,376,872
J Information and Communication	47.25	95.65	45.19	1,570	15,698,044	31,396,087
K Financial and Insurance Activities	34.99	94.78	33.16	444	4,436,785	8,873,571
L Real Estate Activities	57.81	84.55	48.88	4,606	230,321,513	345,482,270
M Professional, Scientific and Technical Activities	46.16	93.66	43.23	5,523	110,468,256	276,170,641
N Administrative and Support Service Activities	47.57	94.79	45.09	3,179	31,791,941	63,583,882
P Education	81.68	100.00	81.68	0	0	0
Q Human Health and Social Work Activities	59.79	99.34	59.40	249	12,425,899	18,638,848
R Arts, Entertainment and Recreation	52.00	92.88	48.30	1,069	53,465,831	80,198,746
S Other Service Activities	43.45	92.75	40.30	2,153	43,064,187	107,660,468
Total				**42,147**	**1,211,847,239**	**2,307,187,065**

					£ of missing investments	
Firm Age Classes	**Firm Investment Opportunities %**	**Acted on Opportunity %**	**Net Investment Rates %**	**No. Firms Under-Invested**	**Low Estimate**	**High Estimate**
0-3	53.57	92.63	49.62	2,057	41,132,979	102,832,447
4-10	54.25	85.90	46.60	11,910	238,203,764	595,509,411
11-20	42.50	95.02	40.38	10,050	200,990,459	502,476,149
>20	46.23	94.65	43.76	18,415	920,752,092	1,381,128,138
Total				**42,431**	**1,401,079,295**	**2,581,946,145**

Debt Aversion Method (No Borrow Slow Grow)

Region	NBSG %	NBSG Number	Total Gap £
East England	75.70	106,722	-1,951,409,279
East Midlands	67.33	65,497	3,444,177,165
London	72.14	185,067	1,016,015,969
North East	77.06	31,751	786,467,713
North West	75.51	108,820	1,886,394,995
Northern Ireland	67.38	26,639	-282,903,923
Scotland	75.25	71,590	2,734,015,415
South East	73.64	152,957	2,385,359,816
South West	77.19	96,745	2,147,257,546
Wales	80.12	44,635	2,582,823,528
West Midlands	77.34	91,220	3,050,401,747
Yorkshire and Humber	79.47	83,944	659,800,106
Total		**1,065,587**	**18,458,400,797**

Firm Size Class	NBSG %	NBSG Number	Total Gap £
Micro	76.49	888,252	13,323,773,978
Small	66.06	145,266	1,561,608,855
Medium	50.71	23,327	-746,451,200
Total		**1,056,844**	**14,138,931,633**

Industry	NBSG %	NBSG Number	Total Gap £
A Agriculture, Forestry and Fishing	67.74	34,752	2,181,564,361
B,D,E Mining and Quarrying, Utilities	64.53	5,851	1,018,456,595
C Manufacturing	77.43	67,076	1,295,247,025

F Construction	79.40	154,077	2,946,716,820
G Wholesale and Retail Trade	76.74	187,870	3,866,362,602
H Transportation and Storage	82.07	38,504	660,346,453
I Accommodation and Food Service Activities	73.65	105,723	1,167,180,566
J Information and Communication	73.70	56,289	-616,362,306
K Financial and Insurance Activities	72.08	17,509	260,538,366
L Real Estate Activities	68.33	35,241	88,101,738
M Professional, Scientific and Technical Activities	75.60	142,684	556,466,274
N Administrative and Support Service Activities	74.44	95,489	-1,464,798,528
P Education	59.16	12,891	0
Q Human Health and Social Work Activities	70.98	44,701	750,983,837
R Arts, Entertainment and Recreation	72.90	21,055	41,056,802
S Other Service Activities	72.44	49,515	912,066,569
Total		**1,069,227**	**13,663,927,174**

Firm Age Classes	**NBSG %**	**NBSG Number**	**Total Gap £**
0-3	85.70	44,643	1,722,097,707
4-10	76.48	119,082	3,047,319,107
11-20	73.64	349,656	6,419,683,705
>20	74.31	553,277	8,216,157,379
Total		**1,066,658**	**19,405,257,899**

Ex Post Underinvestment Method

Region	**UI %**	**UI Number**	**Total Investment of UI Firms £**	**+5%**	**+10%**	**+20%**

East England	21.89	30,861	1,685,756,074	84,287,804	168,575,607	337,151,215
East Midlands	20.78	20,214	401,457,687	20,072,884	40,145,769	80,291,537
London	27.69	71,035	4,718,528,369	235,926,418	471,852,837	943,705,674
North East	16.74	6,897	407,804,951	20,390,248	40,780,495	81,560,990
North West	19.34	27,872	1,136,879,654	56,843,983	113,687,965	227,375,931
Northern Ireland	13.82	5,464	278,241,898	13,912,095	27,824,190	55,648,380
Scotland	17.63	16,772	656,977,778	32,848,889	65,697,778	131,395,556
South East	20.35	42,269	1,602,407,385	80,120,369	160,240,739	320,481,477
South West	22.06	27,649	868,166,660	43,408,333	86,816,666	173,633,332
Wales	31.68	17,649	615,601,239	30,780,062	61,560,124	123,120,248
West Midlands	23.41	27,611	1,852,723,194	92,636,160	185,272,319	370,544,639
Yorkshire and Humber	21.48	22,689	1,267,196,826	63,359,841	126,719,683	253,439,365
Total		**316,983**	**15,491,741,713**	**774,587,086**	**1,549,174,171**	**3,098,348,343**

Firm Size Class	**UI %**	**UI Number**	**Total Investment of UI Firms £**	**+5%**	**+10%**	**+20%**
Micro	21.99	255,362	9,650,136,537	482,506,827	965,013,654	1,930,027,307
Small	22.97	50,511	3,249,122,005	162,456,100	324,912,200	649,824,401
Medium	24.41	11,229	4,266,868,000	213,343,400	426,686,800	853,373,600
Total		**317,102**	**17,166,126,541**	**858,306,327**	**1,716,612,654**	**3,433,225,308**

Industry	**UI %**	**UI Number**	**Total Investment of UI Firms £**	**+5%**	**+10%**	**+20%**
A Agriculture, Forestry and Fishing	12.76	6,546	1,492,525,081	74,626,254	149,252,508	298,505,016
B,D,E Mining and Quarrying, Utilities	6.85	621	0	0	0	0
C Manufacturing	25.04	21,692	1,138,818,984	56,940,949	113,881,898	227,763,797
F Construction	21.48	41,682	2,883,366,847	144,168,342	288,336,685	576,673,369
G Wholesale and Retail Trade	21.42	52,439	1,363,415,511	68,170,776	136,341,551	272,683,102
H Transportation and Storage	17.91	8,403	728,093,987	36,404,699	72,809,399	145,618,797
I Accommodation and Food Service Activities	25.14	36,088	913,384,509	45,669,225	91,338,451	182,676,902
J Information and Communication	28.65	21,882	427,347,664	21,367,383	42,734,766	85,469,533

K Financial and Insurance Activities	13.68	3,323	58,153,803	2,907,690	5,815,380	11,630,761
L Real Estate Activities	31.54	16,267	1,144,756,569	57,237,828	114,475,657	228,951,314
M Professional, Scientific and Technical Activities	20.20	38,124	845,981,989	42,299,099	84,598,199	169,196,398
N Administrative and Support Service Activities	21.51	27,592	799,346,497	39,967,325	79,934,650	159,869,299
P Education	0.00	0	0	0	0	0
Q Human Health and Social Work Activities	18.79	11,833	1,114,121,147	55,706,057	111,412,115	222,824,229
R Arts, Entertainment and Recreation	25.60	7,394	400,000,200	20,000,010	40,000,020	80,000,040
S Other Service Activities	24.00	16,405	759,704,139	37,985,207	75,970,414	151,940,828
Total		**310,291**	**14,069,016,928**	**703,450,846**	**1,406,901,693**	**2,813,803,386**

Firm Age Classes	**UI %**	**UI Number**	**Total Investment of UI Firms £**	**+5%**	**+10%**	**+20%**
0-3	20.38	10,616	683,427,506	34,171,375	68,342,751	136,685,501
4-10	25.31	39,409	1,042,359,649	52,117,982	104,235,965	208,471,930
11-20	21.20	100,661	3,357,058,224	167,852,911	335,705,822	671,411,645
>20	22.23	165,514	9,223,262,612	461,163,131	922,326,261	1,844,652,522
Total		**316,200**	**14,306,107,991**	**715,305,400**	**1,430,610,799**	**2,861,221,598**

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