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Abstract

Many firms use required rates of return on investment – or hurdle rates – to evaluate the attractiveness of their investment projects. This paper examines the adjustment of these hurdle rates to a tightening in monetary policy. Using new survey evidence from the 2022–23 hiking cycle, we find that hurdle rates for UK firms tend to be high and that they responded sluggishly to increases in interest rates over this period. Firms who use external finance to fund investment were more likely to have adjusted their hurdle rates in response to higher interest rates; but even for these firms, only around half of the increase in cost of capital was passed into hurdle rates. Using high-frequency monetary policy shocks over a longer period of time, we show that firms with sticky hurdle rates reduce investment by less in response to contractionary policy shocks than firms that update their hurdle rates more frequently.

Key words: Investment, interest rates, monetary policy, discount rates.

JEL classification: E22, E52, G31.

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1. Introduction

An important way in which monetary policy impacts the economy is through its effects on the capital expenditures of firms. When policy rates rise, this should increase firms' cost of capital and lead them to increase their required rate of return on investment - the hurdle rate - resulting in fewer projects exceeding this hurdle rate and less investment overall. Consequently, the direct effect of monetary policy on business investment depends on the degree to which resultant changes in firms' cost of capital are passed through to firms' hurdle rates.[1]

Hurdle rates are, however, not observable in aggregate data or firms' financial accounts. Previous literature has studied the topic mainly by conducting firm-level surveys or more recently by relying on information from earnings calls, and has as a result mainly represented large, listed companies. This literature is mainly concentrated on explaining the level of hurdle rates that firms set.

This paper contributes to the literature by directly studying the dynamics of hurdle rates and how they responded to changes in monetary policy during a period of significant tightening. To our knowledge, this paper is the first to do so and uncovers important implications for our understanding of how monetary policy works. We do this using new survey evidence from a representative sample of UK firms with 10 or more employees. We show that hurdle rates responded sluggishly to the increase in interest rates from the end of 2021. This slow adjustment was due both to the extensive margin - with many firms not adjusting their hurdle rates at all - and the intensive margin - with those that did adjust not passing on the full rise in their cost of borrowing to their hurdle rates. Firms who use external finance to fund investment were more likely to have adjusted their hurdle rates. The behaviour of firms appears consistent with a "buffer theory" of hurdle rates, where firms who set the highest hurdle rates prior to the recent hiking cycle were less likely to have adjusted and adjusted by less when they did.

Using the information from the 2022-23 hiking cycle to identify firms who have sticky hurdle rates, we show that these firms have also been less responsive to high frequency monetary policy shocks than firms with more flexible hurdle rates over a twenty-year period. In addition, we find evidence of asymmetries: firms with more flexible hurdle rates cut investment by more than firms with sticky hurdle rates in response to contractionary monetary policy shocks but have a similar investment response to expansionary shocks. Such an outcome is consistent with a theory in which hurdle rates act as a buffer and so are upwardly flexible (for some firms) but downwardly rigid (for all firms). The evidence that firms with sticky hurdle rates adjust investment by less when monetary policy tightens is corroborated by firms' self-reported estimates of the impact of the 2022-23 hiking cycle on their investment outturns.

In Section 2, we summarise the relevant literature and highlight where our contribution lies. In Section 3, we describe our data and provide evidence on the characteristics of firms that set investment hurdle rates, and what explains the hurdle rates that they set. In Section 4, we study the dynamics of hurdle rates in response to the 2022-23 tightening in monetary policy,

[1] Monetary policy may also to impact firm investment through indirect channels, for example via a reduction in demand for their goods and services. This would reduce the returns on an investment relative to an unchanged hurdle rate.

demonstrating the slow adjustment of hurdle rates to higher capital costs. Section 5 studies the implications of hurdle rate adjustment for the transmission of monetary policy to firms' investment rates, before we conclude in Section 6.

2. Literature

Recent survey literature, mainly concentrating on large US firms, suggests that firms set hurdle rates in excess of their cost of capital (Sharpe and Suarez (2015), Jagannathan et al. (2016), Graham (2022)). The average level of hurdle rate that these papers find is broadly similar to that which we find in our dataset. These papers tend to focus on explanations of why firms set their hurdle rates higher than their cost of capital and thereby forego profitable investment opportunities. Jagannathan et al. (2016) find that firms with self-reported operational constraints and those with high cash balances use higher discount rates. Firms that report high levels of uncertainty also set higher hurdle rates but this largely reflects passthrough of a higher cost of capital for these firms. They also do not find evidence of an association with measures of financial constraints such as the Kaplan-Zingales index (Kaplan and Zingales (1997)) or Altman Z score (Altman (1968)) as well as firm self-reports on the ease of access to capital. We contribute to this debate by testing similar associations in our dataset which focuses on broader range of firms, and do not find strong evidence of this operational constraint story. We do, however, find a role for uncertainty with firms who report lower levels of uncertainty, setting lower investment hurdle rates.

Other papers in the literature emphasise the relationship between levels of hurdle rates and market power (Gormsen and Huber (2025)), suggesting that the opportunity cost of having an elevated hurdle rate is reduced when competition is limited. Another recent theory (Barry et al. (2024)) points to how higher hurdle rates can convey a bargaining advantage in a delegation problem, effectively enabling managers to ensure those developing investment opportunities bargain for a larger share of the surplus. The evidence in Barry et al. (2024) presents the opposite relationship between hurdle rate and market power Gormsen and Huber (2024) with firms that already have stronger bargaining positions (due to market power over customers or suppliers) employing *lower* hurdle rates. Our work finds no significant relationship between market power and hurdle rates when looking at firms who report that competitors are important for pricing decisions.

The literature has also begun to explore the dynamics of hurdle rates over time (Gormsen and Huber (2025)), Fukui et al. (2024), Graham (2022), Best et al. (2025)), typically finding that hurdle rates are sticky and are not regularly adjusted. We also find this to be the case in our dataset. These papers are largely focused on exploring why hurdle rates have not followed risk-free rates and measures of firm costs of capital downwards since the financial crisis and they argue that sticky hurdle rates may account for "missing investment" over the past decade. In Fukui et al. (2024), the authors also find that incorporating sticky hurdle rates in a New Keynesian model has important implications for monetary policy whereby inflation shocks can have real impacts, and how policy rates can be less effective at stimulating investment. We add to this literature by providing evidence on how hurdle rates have changed during a period in which interest rates have increased substantially, also showing that firms are similarly slow in adjusting their hurdle rates (when arguably the salience of the suboptimality of this behaviour would be greater than when interest rates are declining).

Best et al. (2025) show using vignettes, where firms are asked about how they would adjust their hurdle rates to cuts in their loan rate of varying sizes, that hurdle rates are rarely adjusted downwards (only 37% of firms would adjust even if rates were 4 percentage points lower), but that investment plans may still be adjusted even if hurdle rates are not. We add more empirical evidence to the question of the relationship between hurdle rates and investment and the implications of sticky hurdle rates for monetary transmission, showing that firms that do not adjust their hurdle rates reduce their investment rate by a smaller magnitude in response to policy shocks than those firms which do adjust and that this effect is driven by contractionary shocks.

There is less previous evidence for the UK, but Melolinna et al. (2018) find that hurdle rates in UK firms also tend to be high and sticky and that both firm and aggregate level uncertainty are important for explaining differences between firms. In accordance with this previous literature, we find that hurdle rates are used by larger and more levered UK firms, and those that consider their investment projects more regularly. We also find an important role for uncertainty in explaining the level of firm hurdle rates.

Our work also speaks to a broader literature exploring firm investment dynamics and decision making. A large literature exists on the relationship between uncertainty and investment (see Bond et al. (2005) Bloom et al. (2007), Bloom (2009), Baker et al. (2016)), which points to uncertainty increasing the option value of waiting before committing to an investment project due to the partial irreversibility of investment. Hurdle rates reflect one way in which this could be operationalised, with uncertain firms either setting a higher hurdle rate or changing their hurdle rates more gradually so as to reduce the number of investment projects crossing this threshold.

Evidence on sticky hurdle rates speaks to research looking at the lumpiness of firm investment such as Gurio and Kashyap (2007), Disney et al (2019) and Winberry (2021). All these papers identify the importance of firm-level spikes in investment at driving the aggregate patterns. One way in which these patterns in the extensive margin of investment may manifest is through intermittent changes in the hurdle rate, with firms who smooth their investment potentially being those that adjust their hurdle rate more frequently with changes in their cost of capital. The response of firm investment to monetary policy shocks when hurdle rates are sticky provides some evidence of how sticky hurdle rates could translate into lumpy investment.

Finally, this paper contributes to the literature on monetary policy transmission, specifically on the heterogeneity of firm investment decisions to changes in policy rates. The relative insensitivity of certain groups of firms (defined by leverage, size or age) to changes in the policy rate has been identified by several papers (see for example Ottonello and Winberry (2020), Krusell et al. (2023), Cloyne et al (2023), Paranhos (2024)). By exploring the relationship between the characteristics these papers point to and whether hurdle rates are used or adjusted, as well as providing evidence on how firms with flexible hurdle rates respond to monetary policy shocks, this paper offers further evidence of how these heterogeneities in firm investment response may be micro-founded.

Overall, our paper provides unique firm survey evidence on how hurdle rates are adjusted during a period of monetary tightening and on the implications of this for the transmission of monetary policy to investment.

3. Which firms use hurdle rates and how do they vary across firms?

3.1 Data description

In this paper we use data from the Decision Maker Panel (DMP). The DMP is a large and representative online survey of UK firms, answered mainly by Chief Financial Officers (CFOs).[2] The survey asks about recent developments and expectations for the year ahead in variables such as sales, prices, employment, and investment. An important advantage of the DMP survey relative to many other business surveys is the quantitative nature of the data that it collects.

The survey sampling frame includes UK businesses with ten or more employees from the Bureau Van Dijk FAME database, and covers small, medium and large private companies with at least ten employees. Firms are randomly selected from the sampling frame to be invited to join the panel by a recruitment team based at the University of Nottingham. Once a firm has agreed to join the panel, they receive monthly emails with links to an online survey. Firms who do not respond to three consecutive emails are re-contacted to determine if there are any reasons they have been unable to complete the survey. Since 2022 the survey has averaged just under 2,500 responses per month covering around 4% of UK private sector employment. The surveys have a rotating three-panel structure – each member is randomized at entry into one of the three panels (A, B or C). Each panel is given one third of the questions in any given month, so that within each quarter firms rotate through all questions, ensuring that the survey is a manageable length for firms to answer. Each panel contains a set of regular questions on sales, prices, employment and investment growth and expectations (elicited as probability weighted distribution) as well as a set of more ad-hoc "special" questions on topical policy issues.

The DMP survey is designed to be representative of the UK business population. It covers all industrial sectors and regions of the UK economy and matched up well to UK Business Register (see Appendix Figures A1 and A2). By firm size, Figure A3 shows that the DMP sample contains a greater share of large firms than the Business Register, primarily because smaller firms may lack the necessary accounting data to be included in the sampling fame. Figure A4 shows the DMP's active response rate (defined as the response rate for firms that have responded to at least one survey within the previous 12 months) which is around 50%. The data provided by DMP respondents closely track the equivalent data reported in firms' accounts: Figure A5 compare this for sales and employment in levels and shows a close match, and this similarly holds in growth rates too. Bunn et al. (2024) provides a more detailed overview of the survey, including the structure, quality checks against other datasets, and information on how to access the data.

In this paper we make use of a module of questions on hurdle rates which was presented to firms between February and April 2024. Firms were specifically asked about whether they "set an investment hurdle rate i.e. a target rate for the total rate of return on investment expenditure?". In addition, they were asked to provide the level of this rate today, in 2021 and in 2018; and to outline when they last changed their hurdle rate. In total over these three months 2,227 firms answered these questions (see Appendix Figure A6 for screenshots of these questions). We also make use of the responses of firms to other

[2] 66% of respondents are CFOs and 13% are CEOs, with the remainder mostly senior finance managers.

regular questions around the levels of uncertainty their business faces, and their average cost of borrowing.

Given the sampling frame for the DMP is firms from the Bureau Van Dijk FAME database, we are also able to link firm responses with balance sheet data from Companies House. This provides data on a firm's total assets and liabilities with a lag of around two years on average. In this paper we make use of the most recent accounts data available for each firm to explore the relationship between financial positions and the use of investment hurdle rates, which is typically from financial year 2023/24.

3.2 Evidence on the use and level of corporate hurdle rates

Approximately 30% of firms in our data reported that they set an investment hurdle rate in 2024, on an employment weighted basis.[3] This proportion is broadly in line with previous UK evidence (Levina et al. (2017)).[4] Hurdle rates are more prevalent among firms in industries making more tangible investments, such as those in real estate (45%) and manufacturing (37%) as shown in Figure A8.

Larger firms are more likely to use hurdle rates than smaller firms: over 40% of firms with 250+ employees reported using a hurdle rate compared to under 20% for those with 10-49 employees. Given that bigger firms account for a substantial proportion of aggregate business investment, weighting the survey responses by firms' reported capital expenditure in the DMP raises the proportion of investment done with reference to a hurdle rate to 45%. The use of hurdle rates is higher among firms that primarily use external finance rather than internal cashflow to fund investment. We additionally find that a third of firms who report reviewing their capital expenditure projects every quarter or more frequently report using hurdle rates, while only a quarter of firms who review less frequently do so. This speaks to hurdles rates being more likely to be used by potentially more sophisticated firms who are larger; more likely to be engaged with borrowing or financial markets; and are more likely to have established operational structures around their investment processes.

Column 1 of Table 1 demonstrates that firm size, leverage and how firms fund investment are all significant predictors of hurdle rate use even when jointly controlled for. In addition, firm productivity is an important predictor in our dataset, with more productive firms being more likely to report using a hurdle rate.[5] This provides further evidence that firms who use hurdle rates are likely to be more sophisticated investors than those who do not.

[3] This proportion is not conditional on whether firms report conducting any investment: of those firms that report positive capital expenditures about a third report using a hurdle rate.

[4] For firms not using hurdle rates, almost 40% said that they replace capital items at fixed intervals in a follow up question. Around 20% reported that they set a target payback period for investments, a further 15% made reference to using discounted cashflow models and investing in projects with a positive net present value: these firms may implicitly use a hurdle rate but are no included in our analysis of firms using hurdle rates. See Figure A7.

[5] Productivity here refers to real value added per employee and is calculated using firm accounts data from the Bureau van Dijk FAME dataset.

Table 1: Firm characteristics and use and levels of hurdle rates

	(1) 1 Uses hurdle rate (2024)	(2) Hurdle rate level (2024)	(3) Hurdle rate premium (2024)
Firm accounts characteristics			
Firm age	-0.014	-0.766	-0.060
	(0.015)	(0.979)	(1.078)
Log employment	0.041***	-0.386	-0.678*
	(0.007)	(0.326)	(0.374)
Debt/Assets	0.002***	-0.009	-0.011
	(0.000)	(0.024)	(0.025)
Cash/Assets	-0.000	-0.046	-0.065
	(0.000)	(0.036)	(0.040)
Log labour productivity	0.040***	-0.264	-0.141
	(0.014)	(0.515)	(0.541)
Depreciation/Assets	0.000*	0.001	-0.006**
	(0.000)	(0.003)	(0.003)
Self-reported characteristics			
High uncertainty	0.030	1.729	1.543
	(0.020)	(1.284)	(1.463)
Low uncertainty	-0.007	-4.761**	-1.665
	(0.062)	(2.307)	(2.042)
How firm finances investment			
Borrowing only	0.105***	-3.293	-6.359***
	(0.041)	(2.074)	(2.067)
Borrowing and cashflow	0.036	1.298	-0.207
	(0.025)	(1.624)	(1.917)
Expected sales growth control	Y	Y	Y
Industry F.E	Y	Y	Y
Dependent variable unconditional mean	32%	16.48%	9.52%
Observations	2,227	367	225
R-squared	0.078	0.159	0.218

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Notes: Hurdle rate premium is the difference between firms' reported hurdle rate and cost of borrowing in 2024. Firms are classified as being high uncertainty if they report high or very high uncertainty as a modal answer to the question "How would you rate the overall level of uncertainty facing your business at the moment?" or low uncertainty if their modal response is low or very low. The omitted category is a medium level of uncertainty. Sales expectations controls are the inclusion of average year-ahead expected real sales growth, none of the coefficients on this variable are significant. Firm accounts data are from Bureau van Dijk. Hurdle rate, uncertainty, and how investment is financed are data from the DMP survey.

Hurdle rates tend to be high relative to firms' cost of capital (Figure 1).[6] In 2024, firms reported having a mean hurdle rate of 16%, and a median of 14%. Larger firms typically report having lower hurdle rates than smaller firms. This is illustrated in Figure A9 in the appendix

[6] We focus on the cost of debt as only 4% of firms in our sample using hurdle rates are listed.

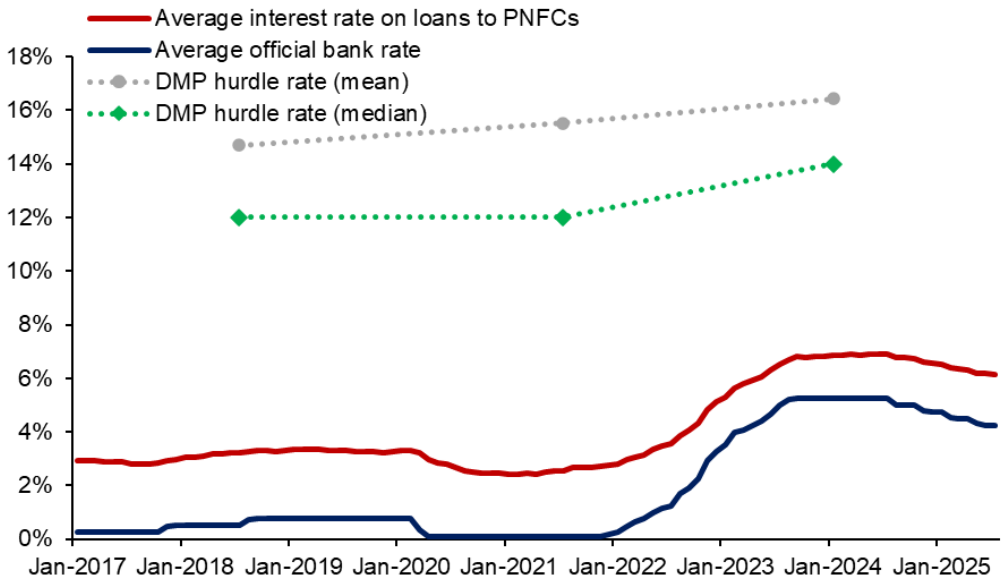
and in column two of Table 1, which explores the relationship between firm characteristics and the level of the hurdle rate set. This regression also provides some evidence that firms with greater liquidity tend to set lower hurdle rates, contrary to the evidence supporting the operational constraints story in Jagannathan (2016). And it shows that hurdle rates are typically lower for firms who report facing lower uncertainty on average.

These results lose some significance when considering the hurdle rates relative to a firm's own cost of bank borrowing (i.e. the hurdle rate premium shown in column 3) although this data is also only available for around 60% of the sample. However, the status of using solely borrowing to fund investment and of firm size are both negatively correlated with a firm's hurdle rate premium. Additionally, we find evidence that firms with shorter-lived assets, as proxied by the depreciation-to-asset ratio, tend to set hurdle rates that are closer to their average cost of borrowing, suggesting that higher hurdle premia could reflect accommodation of term risk.

4. The adjustment of hurdle rates to higher policy rates

Hurdle rates among UK firms increased by less than policy rates during the monetary policy tightening cycle that began at the end of 2021. The mean reported hurdle rate increased from 15.5% in 2021 to 16.4% in 2024. The median rose from 12% to 14%.[7] In comparison, the official Bank Rate (as set by the Bank of England's Monetary Policy Committee) rose from 0.1% at the start of December 2021 to a peak of 5.25% between August 2023 and July 2024. Over the same period the effective interest rate paid on loans by companies – which also captures variations in risk premia – increased from 2.6% to 6.8% (Figure 1). The rise of hurdle rates remains more muted when compared to 5y5y forward rates, which also capture the opportunity cost of medium term cashflows and which rose by 2.5 percentage points between 2018 and 2024.

Figure 1: Mean and median reported hurdle rates and aggregate interest rates

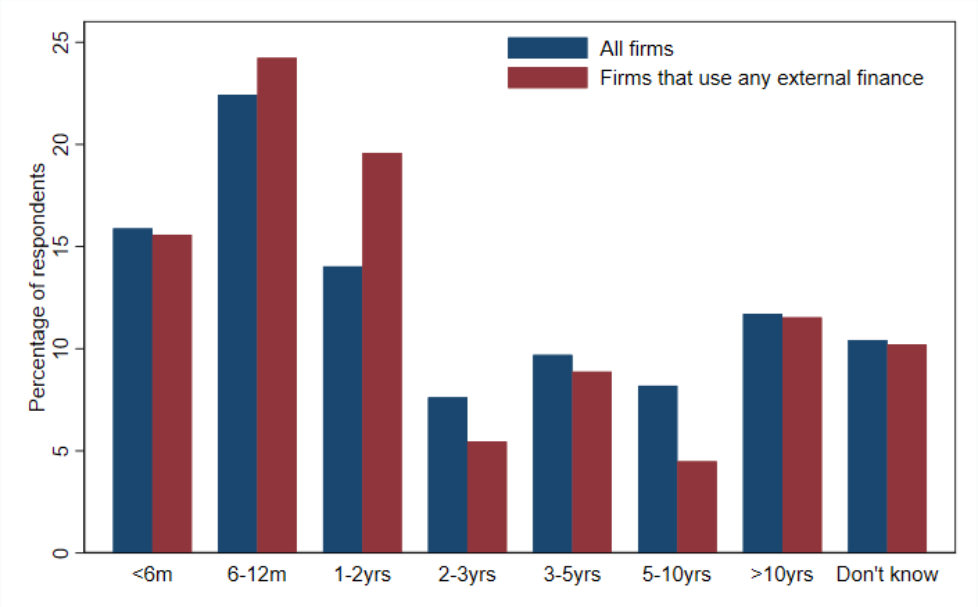


Notes: Based on question "Does your business set an investment hurdle rate. i.e. a target rate for the total rate of return required on investment expenditure?". The reported values have been winsorised at the 5th and 95th percentiles.

[7] These hurdle rates levels are close to averages found in the literature (see Jagannathan et al. (2016) and Gormsen and Huber (2024)).

One reason why hurdle rates rose more slowly than policy rates is because firms only adjust their hurdle rates infrequently. Of firms that use hurdle rates, only 38% reported having adjusted their hurdle rates during the year prior to spring 2024, and 52% reported having adjusted during the previous two years (Figure 2). The other half had not adjusted for over two years at the time of the survey or did not know when their hurdle rate was last updated. However, as shown in Figure 2 those firms that report using external finance to fund their investment were more likely to report that had adjusted their hurdle rate within the past 2 years, with almost 60% of these firms having adjusted.

Figure 2: Time since last change in hurdle rate



Notes: Based on question "Approximately, when did your business last change the investment hurdle rate that it sets?". Asked between February and April 2024. "All firms" refer to all firms that report using a hurdle rate.

We more closely investigate the characteristics of firms who updated their hurdle rate during the 2022-23 tightening cycle in the first column of Table 2. Here, we define updating a hurdle rate as a firm reporting that they updated their hurdle rate within the last two years at the time of the survey, i.e. between early 2022 and early 2024. This very closely aligns with the period over which interest rates increased. Among the half of firms who updated, the mean hurdle rate rose from 14.7% in 2021 to 16.5% in 2024 for the firms who updated, compared to a constant hurdle rate of 16.3% for those who did not update.

The results in Table 2 demonstrate that younger firms were more likely to have updated their hurdle rates, as were firms who use borrowing to fund investment and so were most exposed to changes in monetary policy. We find a role for firm year-ahead sales expectations with firms who expect their sales to grow more strongly in 2024, being more likely to have adjusted their hurdle rate. This result potentially points to a demand driven impulse with firms who believe they have strong investment opportunities being more likely to reset their hurdle rates before deploying capital.

In the second column, we explore how the size of these adjustments varied across different firms. We find evidence of the hurdle rate acting as a buffer as firms with higher initial

hurdle rates adjusted by less. Finally, we also find a role for uncertainty in the adjustment process as firms reporting low uncertainty are likely to have increased their hurdle rates by a smaller amount relative to firms who report a medium level of uncertainty.

Table 2: Firm characteristics and changes in hurdle rates

	(1)	(2)	(3)	(4)	(5)	(6)
	=1 Changed rate last 2 years	Hurdle rate change (2021-2024)				
				(External financers only)	(External financers only)	(Changed in last 2 years)
Firm accounts characteristics						
Firm age	-0.094**	-0.044			-0.045	0.163
	(0.041)	(0.313)			(0.626)	(0.880)
Log employment	-0.002	-0.040			-0.189	-0.179
	(0.015)	(0.095)			(0.232)	(0.265)
Debt/Assets	-0.000	0.000			0.013	0.023
	(0.001)	(0.007)			(0.015)	(0.021)
Cash/Assets	-0.002	-0.001			-0.001	0.037
	(0.001)	(0.011)			(0.021)	(0.028)
Log labour productivity	-0.003	-0.188			-0.191	0.375
	(0.029)	(0.164)			(0.495)	(0.545)
Depreciation/Assets	0.000	0.001			0.001	0.000
	(0.000)	(0.001)			(0.001)	(0.002)
Self-reported characteristics						
High uncertainty	0.009	-0.167			1.026	2.124**
	(0.054)	(0.392)			(0.749)	(0.920)
Low uncertainty	-0.135	-1.534**			0.247	-1.685
	(0.149)	(0.727)			(1.477)	(1.447)
Hurdle rate (2021)	-0.003	-0.060***			-0.174***	-0.078
	(0.002)	(0.020)			(0.033)	(0.052)
Expected sales growth (2023)	0.006**	0.039			0.074*	0.069
	(0.002)	(0.024)			(0.042)	(0.042)
How firm finances investment						
Borrowing only	0.212***	1.087				
	(0.079)	(0.702)				
Borrowing and cashflow	0.009	-0.039				
	(0.066)	(0.508)				
Borrowing rate change			0.141	0.372**	0.411**	0.494*
			(0.133)	(0.161)	(0.204)	(0.290)
Industry F.E	Y	Y	N	N	Y	Y
Observations	444	367	184	103	103	101
R-squared	0.140	0.136	0.006	0.040	0.442	0.351

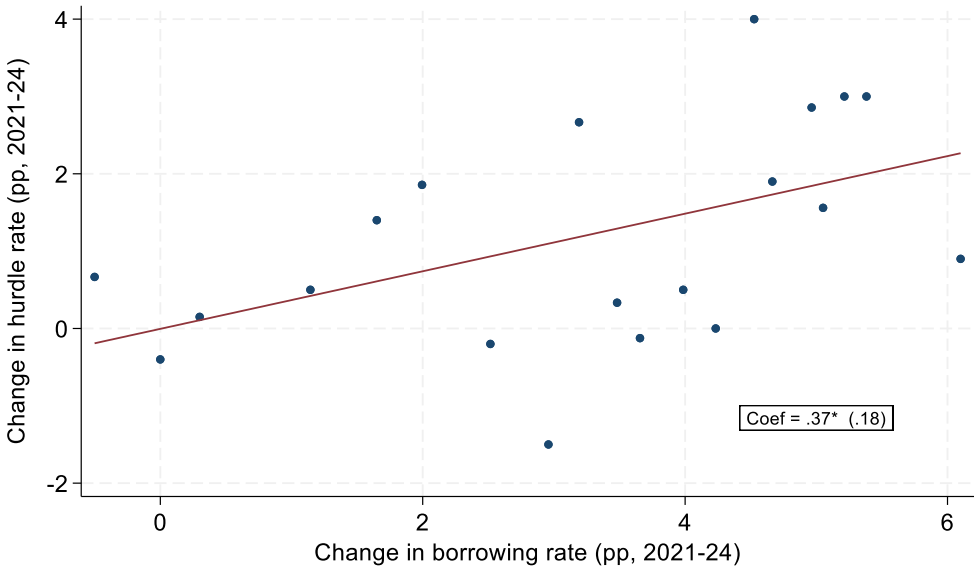
Notes: In column (1) the dependent variable is a dummy variable which takes value 1 for those firms that have changed their hurdle rates in the last two years. Columns (2) – (6) looks at the percentage point change in hurdle rates between 2021 and 2024. Firms are classified as being high uncertainty if they report high or very high uncertainty as a modal answer to the question "How would you rate the overall level of uncertainty facing your business at the moment?" or

low uncertainty if their modal response is low or very low. Columns (3) and (4) restrict the sample to focus only on firms that report using funding their investment with some form of external finance.

While these regressions are informative about the characteristics of firms who have adjusted, it is likely that passing on changes in the cost of capital is an important motivation for firms that adjust their hurdle rates. How much of the increases in the cost of capital that firms face is passed on to their hurdle rates? Columns three to six in Table 2 study the relationship between changes in hurdle rates from 2021 to 2024 and changes in the interest rate that firms pay on their bank borrowing (a proxy for their changes in their cost of capital). For all firms using hurdle rates together, this relationship is insignificantly different from zero (column three). However, this includes firms who borrow for different reasons.

In column four of Table 3 (and Figure 3) we restrict the sample to those firms who report in the survey that they use external finance to fund their investment (either as the sole source of funds or in combination with internally generated cashflow). For this group of firms, we find a positive and significant relationship between the change in their cost of borrowing since 2021 and the change in their hurdle rate over the same period. The slope suggests that a one percentage point increase in the interest rate on a firm's bank borrowing is associated with a 0.37 percentage point rise in their hurdle rate. Estimated pass through increases to 0.41 when controlling for the initial hurdle rate and other firm characteristics. Those with higher initial hurdle rates again adjust by less even controlling for the changes in their cost of borrowing. The degree of pass-through is again around 50% if we take an alternative approach of limiting the sample to firms who have updated their hurdle rate in the past two years, regardless of how investment is financed (column 6).

Figure 3: Change in reported borrowing rates and hurdle rates: firms using external finance to invest



Notes: Binned scatterplot based on question "What is the percentage investment hurdle rate that your business sets, both now and back in 2021?" and "What is the approximate average annualised interest rate on the interest-bearing borrowing that your business has both now and at the end of 2021?" Each dot represents 5% of observations, grouped by change in the interest on their bank borrowing between 2021 and 2024.

Overall, hurdle rates appear to have responded sluggishly to tighter monetary policy in 2022-23. Just over half of firms updated their hurdle rate during this period, but the other half did

not. And for those firms that did adjust their hurdle rates, only around half of the increase in their cost of capital was reflected in a higher hurdle rate.

5. Implications of sticky hurdle rates for the transmission of monetary policy to investment

If firms have sticky hurdle rates, it is likely that this will have implications for the extent to which firm investment responds to changes in monetary policy. We explore this issue in this section, both by examining the response of firm investment to high frequency monetary policy shocks and by using self-reported estimates of the impact of increases in interest rates on capital expenditure.

To investigate whether the investment of firms with sticky/flexible hurdle rates responds differently to monetary policy shocks, we adapt the approach taken by Ottonello and Winberry (2020) to assess the heterogeneities in monetary transmission. Specifically, we estimate a local projection in the style of Jorda (2005), interacting monetary policy shocks with a dummy variable for whether firms have flexible or sticky hurdle rates.

For this exercise we use accounting data from Bureau van Dijk FAME database between 2001 and 2023, matched to DMP data on whether firms have sticky hurdle rates. We assume that firms in the DMP who report changing hurdle rates between 2022 and 2024 always have more flexible hurdle rates than those firms who did not adjust over this period: i.e. hurdle rate stickiness is a time-invariant characteristic of firms. The 2022-23 tightening cycle is by far the largest increase in policy rates during our sample period since 2001, and so it seems reasonable to assume that firms who did not update during this period would also have had relatively stable hurdle rates in earlier periods too. To the extent that the stickiness of hurdle rates over time is measured with error, this would likely under-estimate the differences in investment responses between firms with flexible and sticky hurdle rates. But as we show below, we still find some material differences.

With this data we estimate the following equation:

$$\log\left(K_{i,t+h}\right) - \log\left(K_{i,t-1}\right) = \alpha_{ih} + \beta_g^h\left(\varepsilon_{t,t-3q}^m \cdot I[Z_i \in g]\right) + \gamma_h X_{i,t-1} + \varphi_h M_{i,t-1} + e_{i,t,h} \quad (1)$$

where h indexes the time horizon in years. Following Ottonello and Winberry (2020), on the left-hand side of the equation we study the cumulative growth of the firm-level total capital stock over the time horizon (defined as the stock of tangible fixed assets). This measure of investment accounts for differences in depreciation of capital across firms, effectively meaning only positive net investment, which adds to the capital stock, is considered. The variables α_{ih} are firm fixed effects which control for invariant firm characteristics. The variable ε^m is the four-quarter rolling-sum of monetary policy shocks (scaled to represent a 25bps increase in 1yr gilt yields) at time t; and $I[H_i \in h]$ is an indicator which takes the value 1 if a firm that uses hurdle rates has reported adjusting them over the two years prior to 2024 (i.e. if they have flexible hurdle rates). $X_{i,t-1}$ are a set of controls including firm-level controls of two lags of annual sales growth from firm accounts and of the current asset ratio, and $M_{i,t-1}$ are macroeconomic controls including current and lagged four-quarter averages of GDP growth, the CPI inflation rate; and the unemployment rate. Following the framework of Almuzara and Sancibrián (2024) for robust inference when estimating how micro-economic

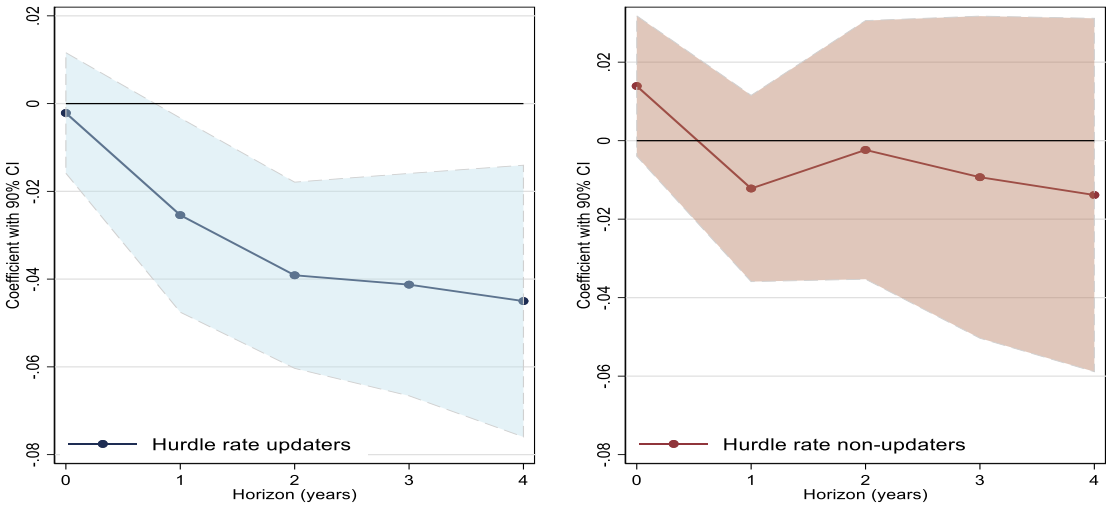
actors respond to macro-level shocks, we also include four lags of monetary policy shocks interacted with whether a firm has changed its hurdle rate, four lags of firm-level annual capital stock growth and cluster standard errors by time.

To identify monetary policy shocks, we use the UK Monetary Policy Event-Study Database (Braun et al. 2025) which identifies policy shocks as high frequency changes in interest rate markets around UK monetary policy events from 1997 onwards. Specifically in the analysis which follows we focus on the "Target" factor-shocks which captures shocks to the shorter end of the yield curve. These shocks reflect the immediate policy decision rather than possible information effects about the future state the economy which may influence interest rates at longer maturities.

The coefficients β_g^h allow the estimation of impulse response functions for both firms that have sticky hurdle rates and those with flexible hurdle rates. These impulse responses are presented in Figure 4, the left panel shows how firms with flexible hurdle rates reduce investment sharply over the first two years following a positive monetary policy shock. By contrast firms with sticky hurdle rates do not make statistically significant alterations to cumulative investment. Figure A11 in the appendix additionally includes firms who report not using hurdle rates at all and demonstrates that they also display a minimal investment response to monetary policy shocks. Our results therefore show that the overall impact of monetary policy on investment appears to be driven by a subset of firms who use hurdle rates and actively adjust them when policy rates (and their cost of capital) change.

In Figure A12 we run a similar exercise looking the employment impulse response functions to monetary policy shocks for firms with sticky and flexible hurdle rates. We find that employment responds in a similar way over the horizon considered for both categories of firm. Firms with a flexible hurdle rate reduce both cumulative investment and employment in response to a monetary policy shock, while those with sticky hurdle rates appear to only react by adjusting their employment.

Figure 4: Investment impulse response to monetary policy shocks by whether not a firm has a flexible or sticky hurdle rate



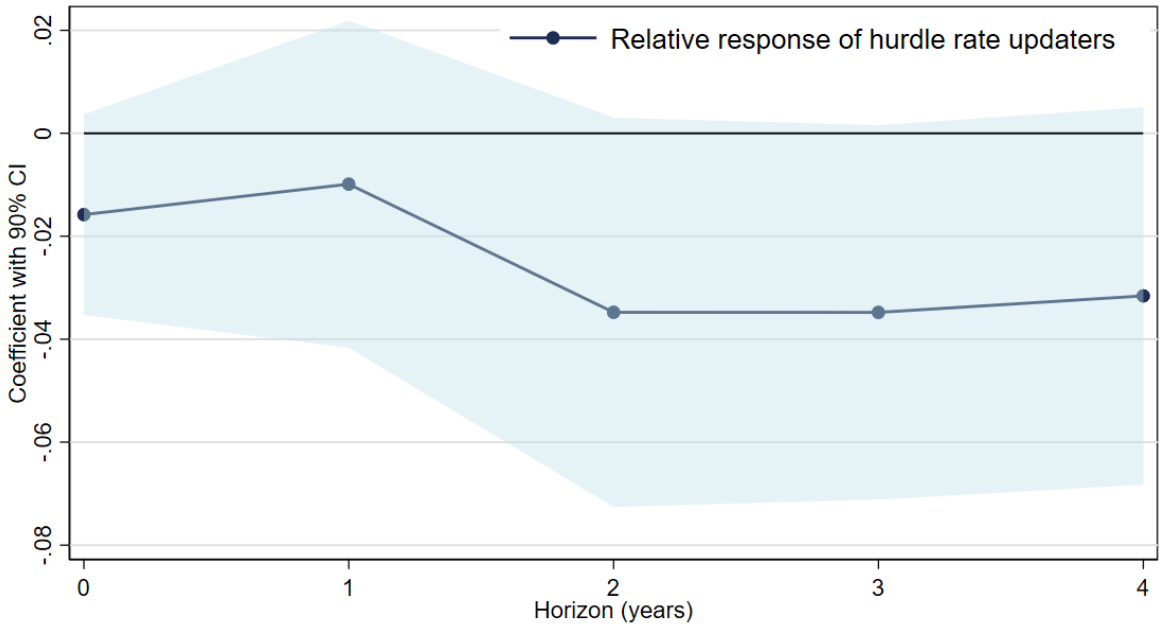
Notes: Shaded areas represent 90% confidence intervals.

To examine the significance of relative differences between the investment response of firms with sticky hurdle rates and those with flexible hurdle rates we also estimate an alternative specification of the equation:

$$\log(K_{i,t+h}) - \log(K_{i,t-1}) = \alpha_{ih} + \alpha_{t(q),h} + \beta^h(\varepsilon^m_{t,t-3q} \cdot I[Z_i \in g]) + \gamma_h X_{i,t-1} + e_{i,t,h} \quad (2)$$

This specification replaces the macroeconomic controls with quarterly time fixed effects ($\alpha_{t(q),h}$) which control for all time varying factors which are common across firms.[8] The coefficients of interest, β^h, measure how the cumulative response of a firm's capital stock in time t+h to a monetary policy shock at time t, depends on if it has flexible hurdle rates. These coefficients trace the *relative* impulse response function of the capital stock in response to a monetary policy shock for firms that adjust hurdle rates relative to firms with sticky hurdle rates. Figure 5 charts this relative impulse response function and shows that firms with flexible hurdle rates are more responsive to monetary policy shocks. Firms with flexible hurdle rates are estimated to reduce investment in response monetary policy shock by more than firms with sticky hurdle rates on impact, and the difference in the cumulative growth of the capital stock between firms builds to a peak after two years, before marginally declining over the following two years.

Figure 5: Relative investment impulse response to monetary policy shocks for firms with flexible vs sticky hurdle rates



Notes: Reports coefficients β_h from Equation 1. Shaded area represents 90% confidence interval.

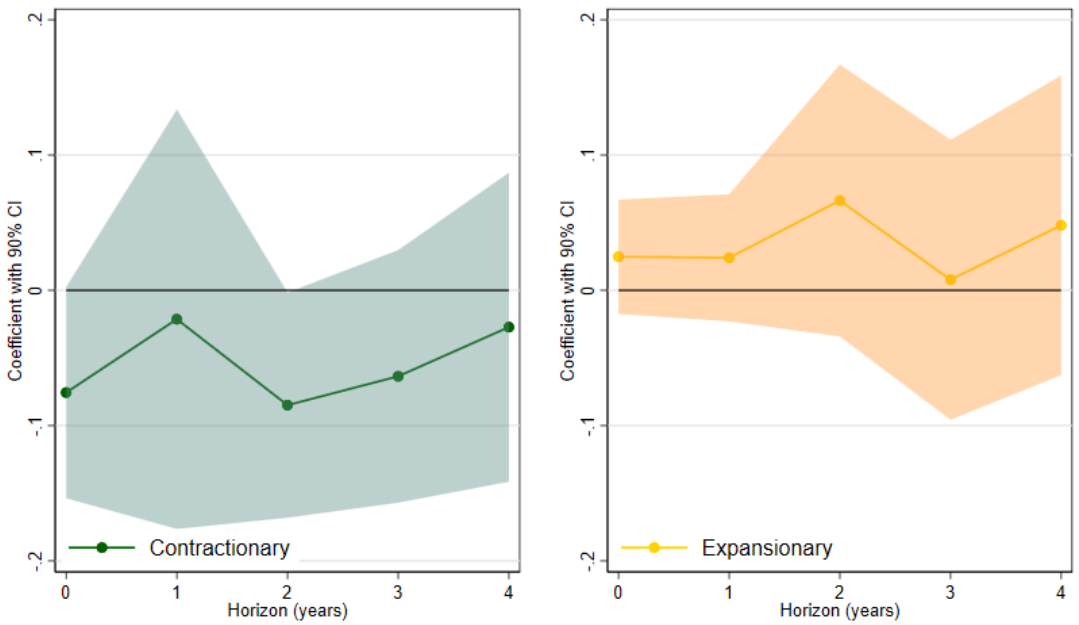
We further extend our analysis to explore asymmetries in firm responses to contractionary versus expansionary monetary policy shocks. We do this by re-estimating equation 2 conditional on whether a shock is contractionary or expansionary (i.e. a positive monetary policy shock is contractionary). Figure A13 provides a time series of our 12m rolling monetary policy shocks and reveals how they compare to annual changes in Bank rate. This augmented

[8] Time fixed effects will therefore control for any macroeconomic and financial developments (which are experienced by all firms) without needing to specify which variables impact the investment decision.

equation estimates two relative impulse response functions which detail the relative response of the cumulative capital stock of firms with flexible hurdle rates relative to those with sticky hurdle rates to contractionary shocks and expansionary shocks separately.

Figure 6 shows that the heterogenous responses of firms who adjust hurdle rates is driven by contractionary monetary policy shocks in the left panel, whereas both types of firms respond similarly to expansionary shocks in the right panel. Figure A14 shows the absolute impulse response functions for contractionary and expansionary shocks by whether firms have flexible or sticky hurdle rates and if they do not use them; it confirms that flexible firms respond more significantly to contractionary shocks than firms with sticky hurdle rates. This result may reflect the fact that our measure of whether firms adjust hurdle rates has been determined over a period where rates have risen and so may better capture firms with upwardly flexible hurdle rates. Alternatively, it may highlight a mechanism by which monetary contractions may have larger impacts than expansions (see Tenreyro and Thwaites (2016) and Angrist et al. (2018)), namely the hurdle rates of firms with flexible rate tend to only be upwardly flexible and therefore the firms cut investment more strongly in response to monetary contractions than firms with sticky hurdle rates, but do not increase investment as strongly when expansionary shocks take place.

Figure 6: Relative investment impulse response for firms with flexible vs sticky hurdle rates by whether monetary shocks if contractionary or expansionary



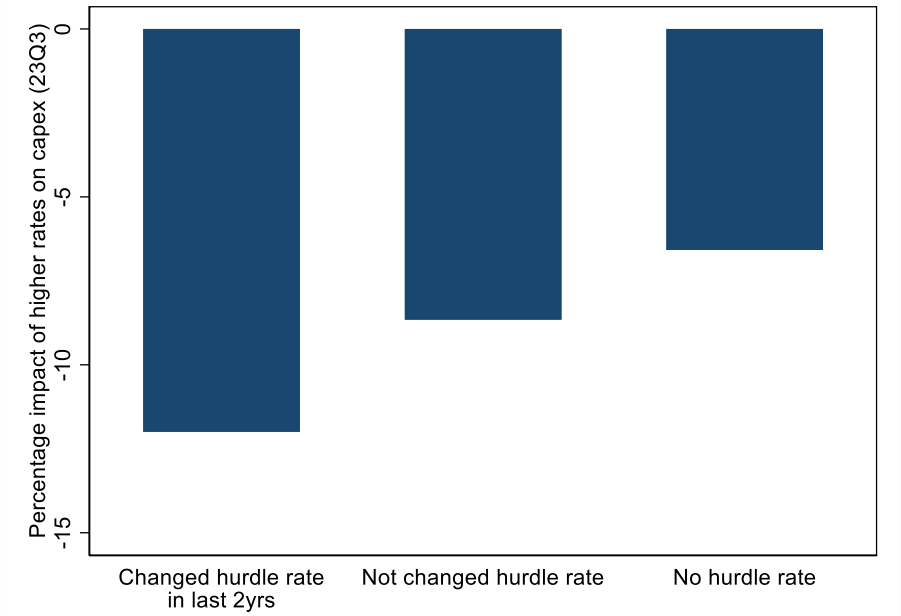
Notes: Shaded areas represent 90% confidence intervals. The sign of the coefficients for expansionary shocks has been inverted to show how investment increases for firms with flexible hurdle rates relative to firms with sticky hurdle rates.

As a cross-check to our broader analysis of how the investment of firms with sticky and flexible hurdle rates responds to monetary policy shocks, we can use direct survey evidence from the 2022-23 tightening cycle. Between November 2023 and January 2024, firms in the DMP survey were asked to estimate the impact of increases in interest rates since 2021 on their investment – effectively asking them to estimate the marginal impact of policy rates on their investment. Firms who had updated their hurdle rates during the tightening cycle reported making substantially larger cuts to investment of around 12% by 2023 Q3 (i.e. almost two

years into the hiking cycle) compared to 7% for those who had not adjusted (Figure 7). These differences are statistically significant, and they remain so after controlling for firm characteristics too (see regressions in Table A1 in the Appendix).

Overall, the survey evidence is supportive of the conclusions of the local projections analysis. Both exercises provide clear evidence of firms with flexible hurdle rates making larger reductions in investment when monetary policy tightens than firms with more sticky hurdle rates, and that these differences appear to be important in understanding how investment responds to monetary policy in aggregate.

Figure 7: Reported impact of higher interest rates on investment by when last adjusted hurdle rate



Notes: Values based on the question "holding other factors constant, what is your best estimate of the impact of changes in interest rates since the end of 2021 on the capital expenditures of your business in 2023 Q3?".

6. Conclusion

In this paper, we report new survey results on investment hurdle rates for firms in the UK. In particular, we add to the literature by focusing on how hurdle rates responded to the sharp tightening in monetary policy after 2021. The firms that set hurdle rates are larger and more likely to use external finance for investment. In the face of higher policy rates, only just over half of firms adjusted their hurdle rates, and when they did, these changes were typically smaller than the associated changes in their cost of borrowing. Pass-through was highest for firms who use external finance to fund investment and firms who had a smaller buffer between their cost of capital and hurdle rate. Using data from 2001-2023, we also show using local projection analysis, how the investment of firms with flexible hurdle rates has been more responsive to monetary policy shocks than for firms with sticky hurdle rates, particularly for contractionary shocks. That larger investment response is also is consistent with survey-based evidence from firms over the more recent tightening cycle. Our work shows how exploring the slow and limited adjustment of hurdle rates, and how they mediate the impact of monetary policy shocks on firm investment, is important for understanding of how monetary policy transmits to the economy.

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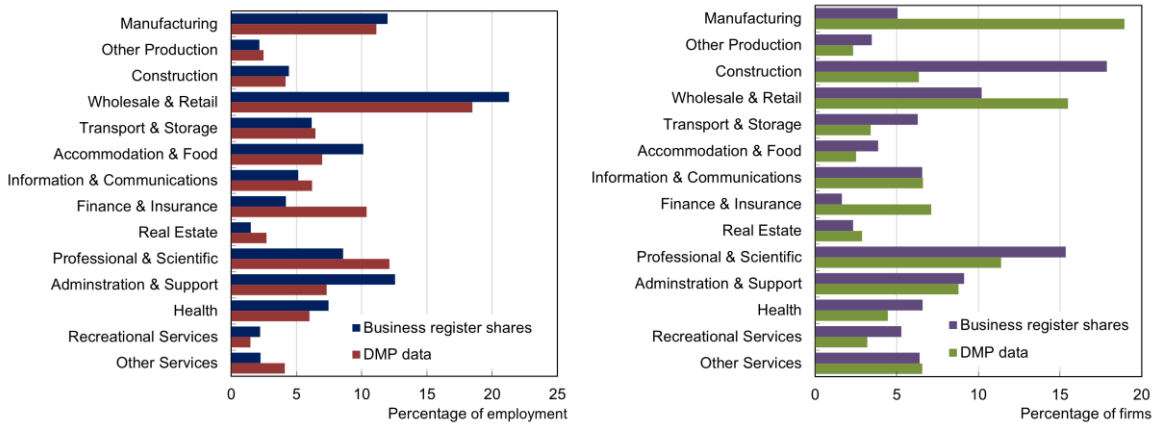
Appendix:

Table A1: Firm capital expenditure responses to higher interest rates in 2023 Q3

	(1) Impact of rates on capex (%)	(2) Impact of rates on capex (%)	(3) Impact of rates on capex (%)
Recently changed hurdle rate	-5.826***	-5.026***	-4.735***
	(1.617)	(1.631)	(1.664)
Hurdle rate unchanged	-1.160	-1.125	-1.023
	(1.695)	(1.709)	(1.748)
Industry (SIC2) FE	No	Yes	Yes
Age	No	Yes	Yes
Size	No	Yes	Yes
Leverage	No	No	Yes
R2	0.040	0.043	0.046
Observations	1,566	1,566	1,541

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A1: DMP sample by industry (2017-2023)



Notes: Other production includes agriculture; forestry & fishing; mining & quarrying; electricity, gas & air conditioning supply; water supply; and sewerage, waste management & remediation activities.

Figure A2: DMP sample by region (2017-2023)

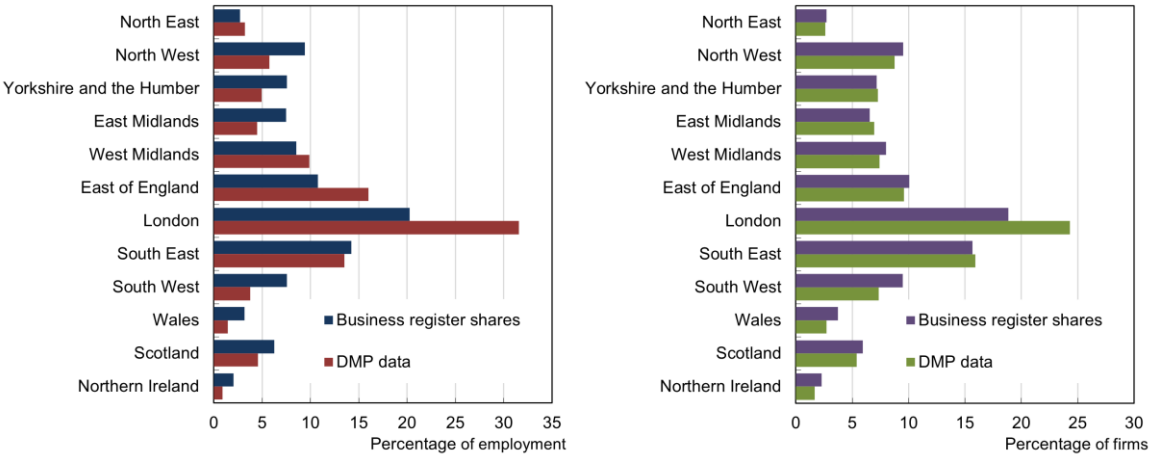


Figure A3: DMP sample by firm size (2017-2023)

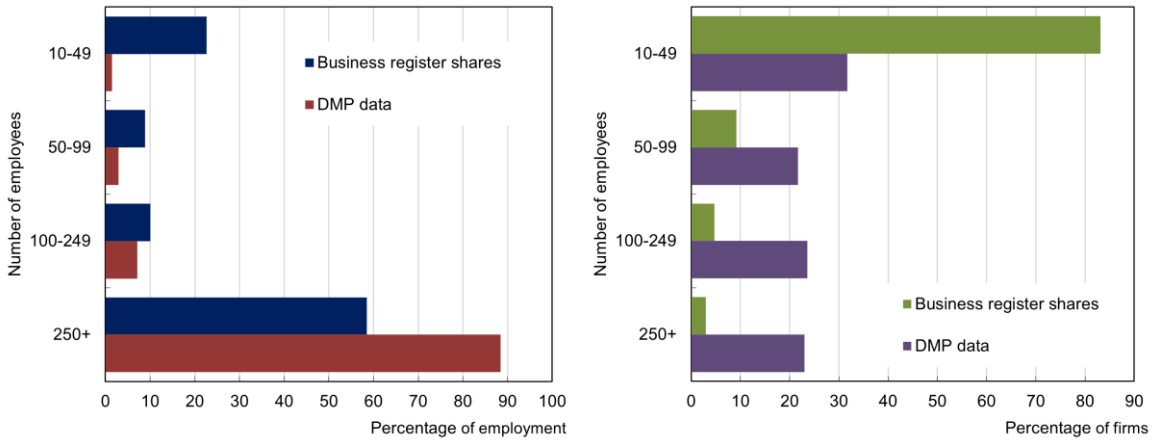
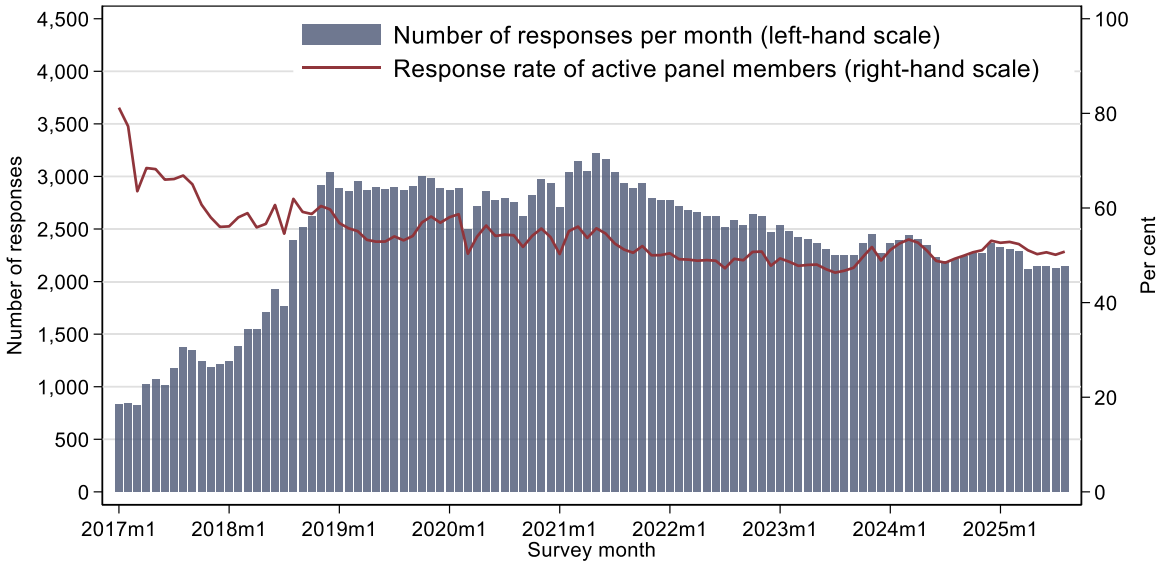
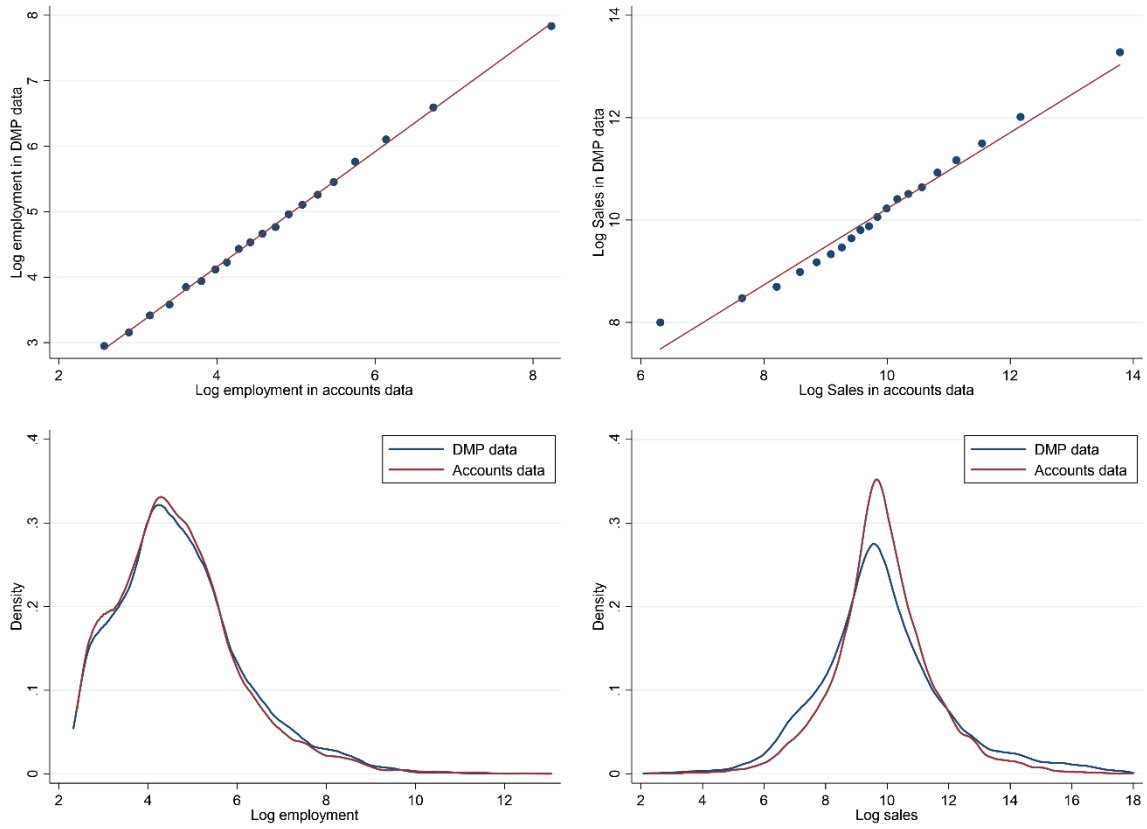


Figure A4: DMP response rate



Notes: The response rate of active panel members in the Decision Maker Panel is calculated as the percentage of panel members who had completed at least one survey over the last twelve months who responded to the survey in a given month.

Figure A5: DMP and company accounts data: levels



Notes: The dots on the top charts each represent 5% of observations, grouped by log employment/sales from accounts data. Charts are based on annual data between 2017 and 2022.

A6: Survey questions on hurdle rates

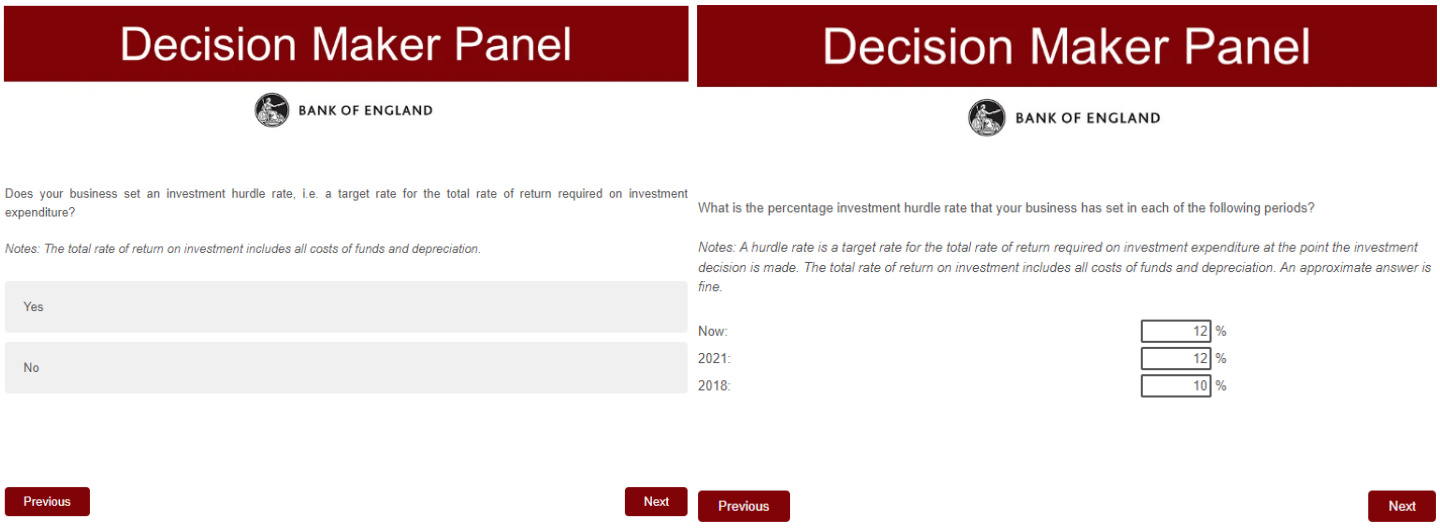


Figure A7: Alternative investment approaches used by firms who report not setting a hurdle rate

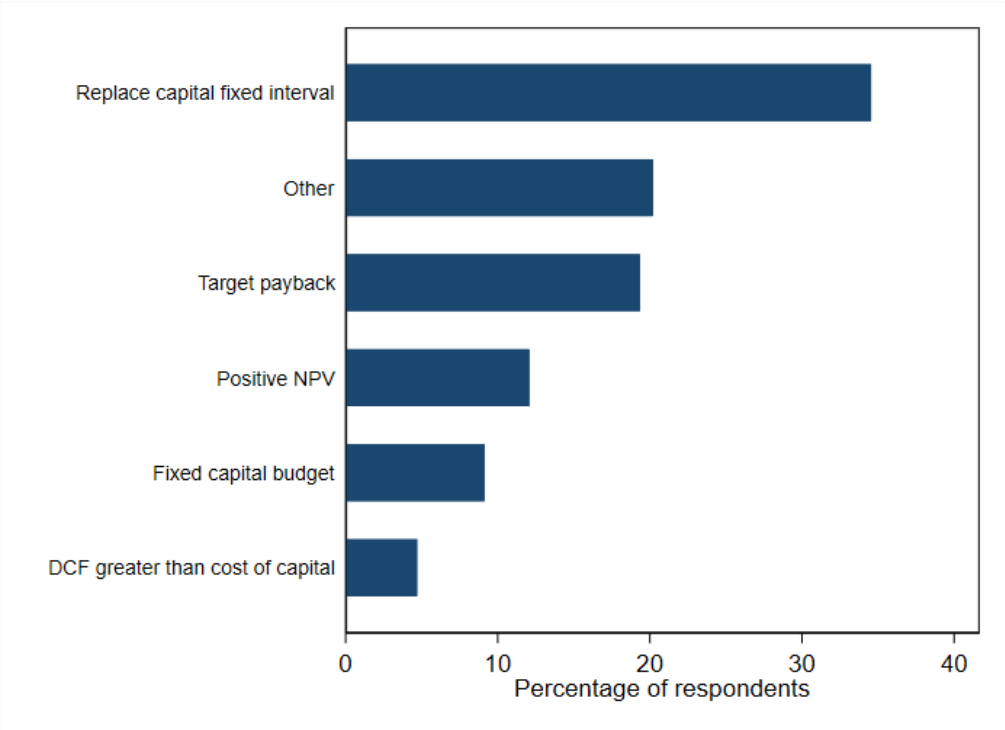
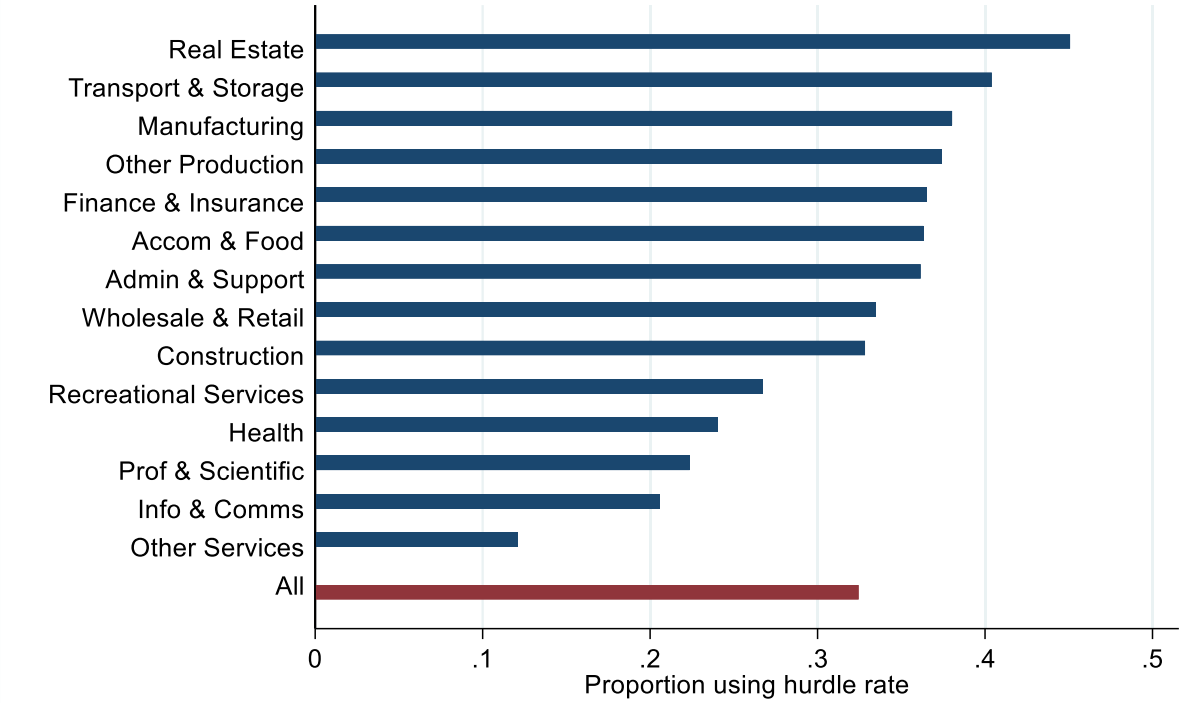


Figure A8: Proportion of firms reporting using investment hurdle rates by sector



Notes: Based on question "Does your business set an investment hurdle rate. i.e. a target rate for the total rate of return required on investment expenditure?".

Figure A9: Binscatter of hurdle rate level versus firm size

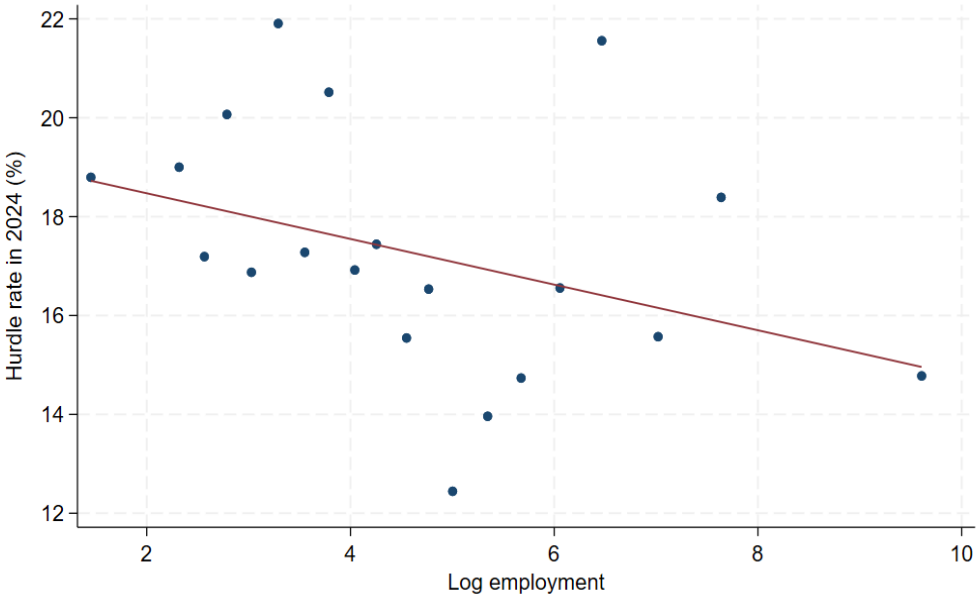
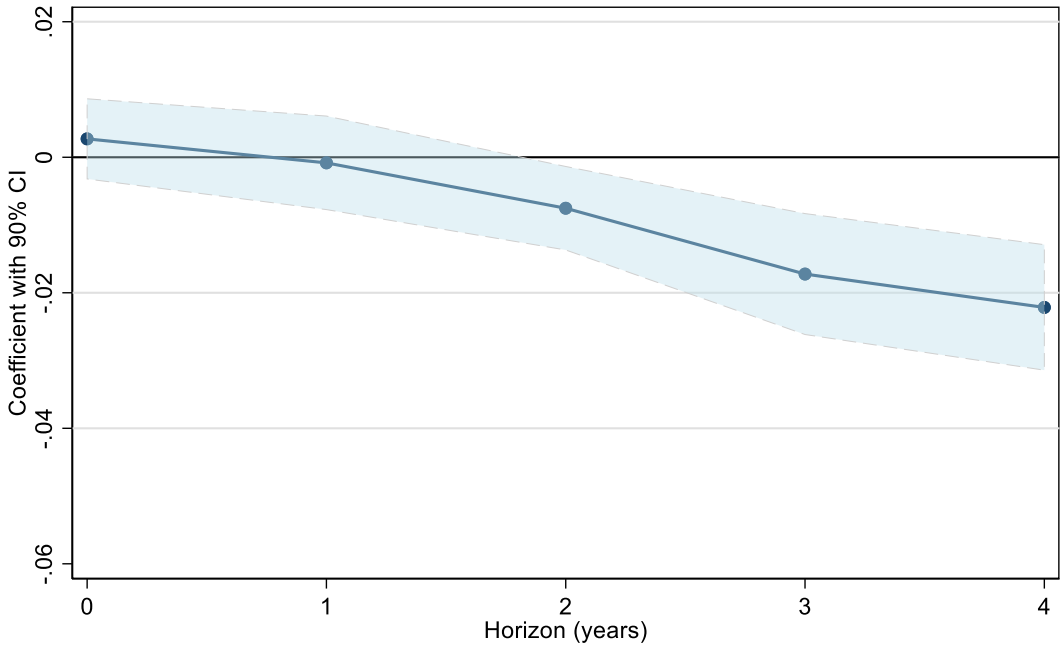
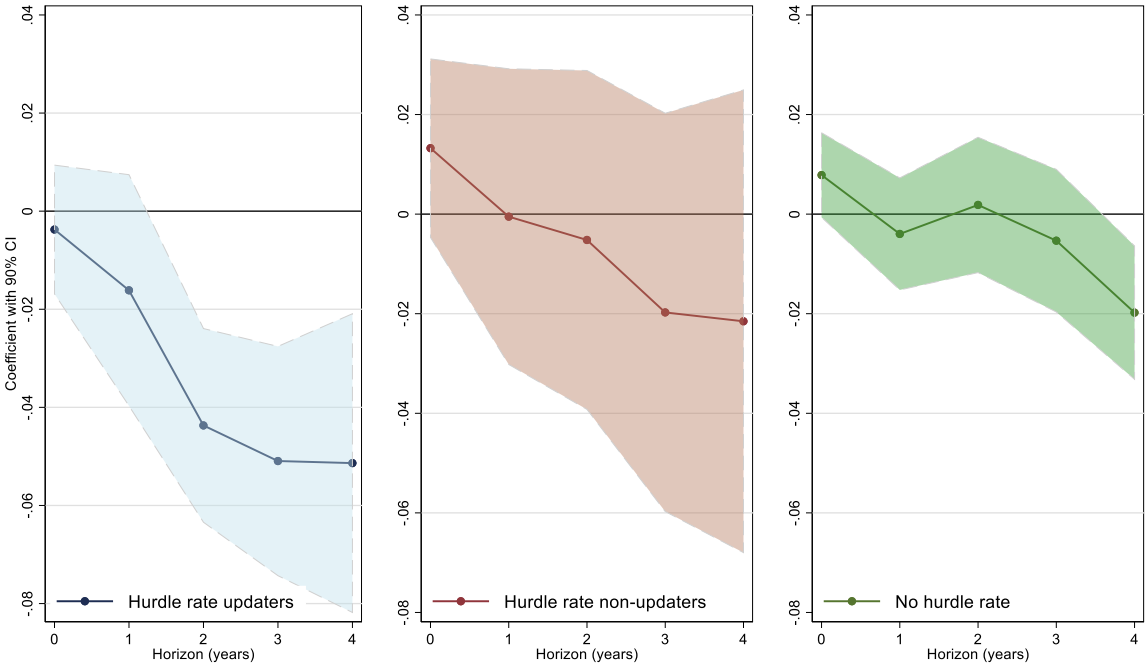


Figure A10: Impulse response function for investment: average across all firms



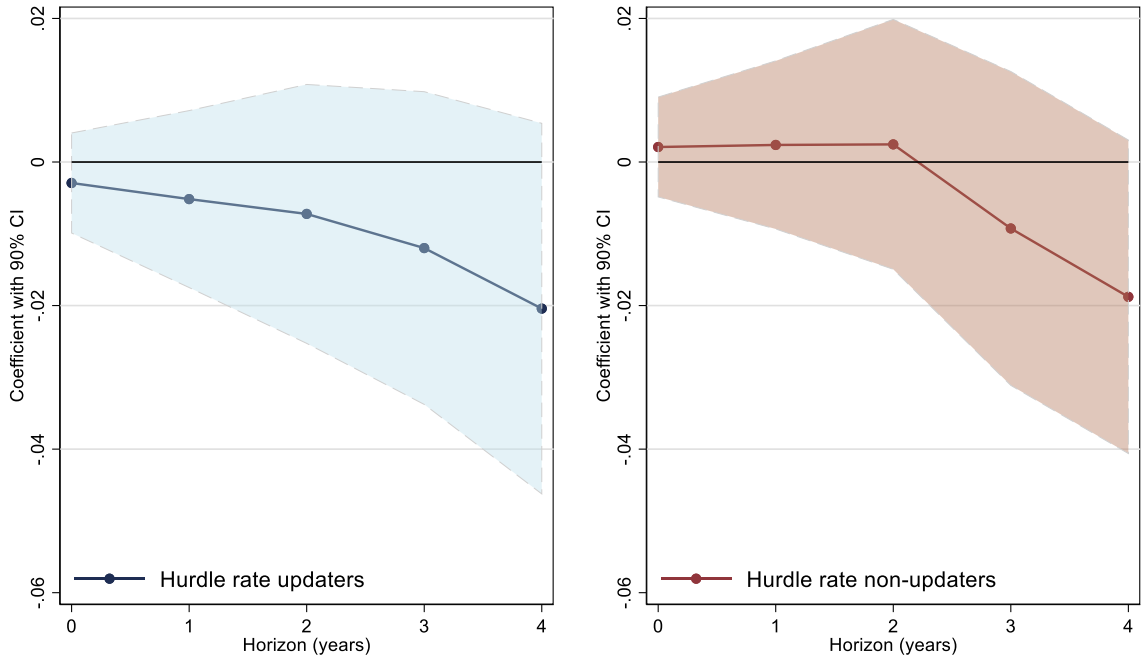
Notes: Includes all firms in the Bureau Van Dijk database. Shaded areas represents 90% confidence intervals.

Figure A11: Impulse response function for investment by whether firms have sticky, flexible or no hurdle rates



Notes: Shaded areas represent 90% confidence intervals.

Figure A12: Impulse response function for employment by whether firms have sticky or flexible hurdle rates



Notes: Shaded areas represent 90% confidence intervals

Figure A13: Rolling 12-month monetary policy shock series and year-on-year changes in Bank rate

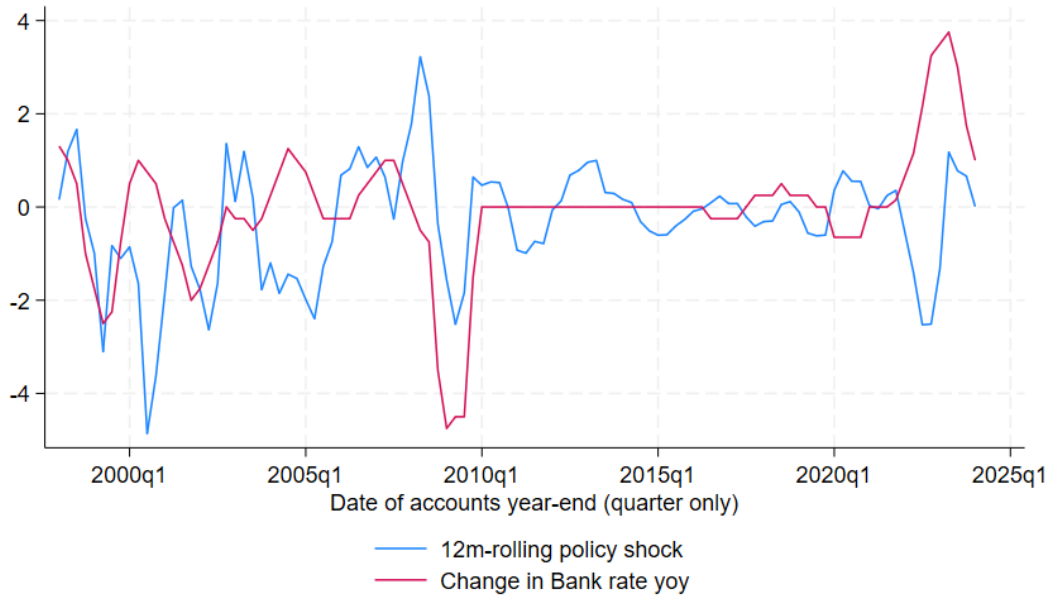
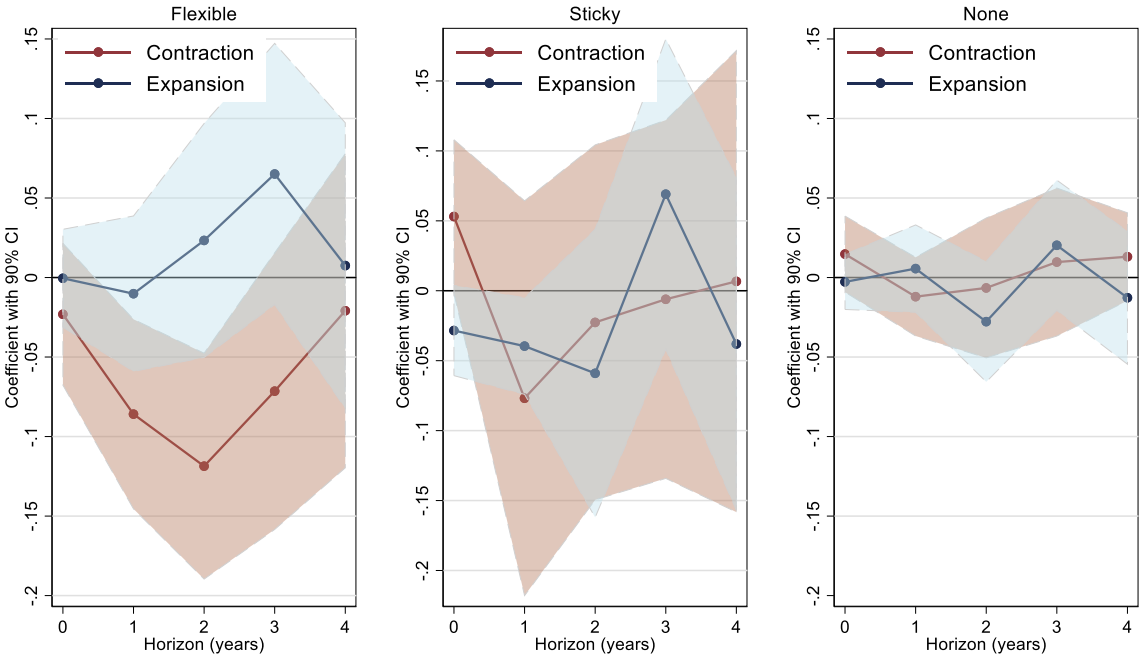


Figure A14: Impulse response function for investment by whether firms have sticky, flexible or no hurdle rates and by expansionary or contractionary shocks



Notes: Shaded areas represent 90% confidence intervals. The sign of the coefficients for expansionary shocks has been inverted to show how investment increases for firms.