Inflation Expectations, Investment, and the Mundell-Tobin Financing Channel*

Jackson Mejia† Giuditta Perinelli‡ Alex Tagliabracci§

April 4, 2026

The term structure of inflation expectations, not just their level, determines how monetary policy transmits to investment. Using a randomized information provision experiment and administrative data on Italian firms, we document two new facts: the investment semi-elasticity with respect to expected inflation nearly doubles from six months to several years, and the response is concentrated in tangible assets, roughly four times the intangible effect. These patterns, together with heterogeneity by leverage and debt maturity, point to a Mundell-Tobin financing channel in which firms lock in long-term nominal borrowing to fund tangible assets. We formalize this in a model yielding a sufficient statistic that maps debt structure into the investment response to inflation expectations at each horizon.

*We thank Tomas Caravello, Hui Chen, Janice Eberly, Vicente Jimenez Gimpel, Nobuhiro Kiyotaki, Tong Liu, Debbie Lucas, Giacomo Mangiante, Pedro Martinez-Bruera, Lira Mota, Tim de Silva, Christopher Palmer, Jonathan Parker, Tiziano Ropele, Larry Schmidt, Alessandro Secchi, Kazuatsu Shimizu, Kerry Siani, David Thesmar, Emil Verner, Christian Wolf, and Roberta Zizza for their useful comments at different stages of this work. All the remaining errors and omissions remain ours. *The opinions expressed in this paper are those of the authors and do not necessarily reflect the view of the Bank of Italy and the Eurosystem.*

†Department of Economics, MIT, jpmejia@mit.edu. This material is supported by the NSF under Grant No. 1122374.

‡Department of Finance, MIT Sloan School of Management, gperinel@mit.edu.

§Bank of Italy, DG Economics, Statistics and Research, alex.tagliabracci@bancaditalia.it.

1 Introduction

Investment is fundamentally forward-looking. Decisions on whether and how much to invest in long-lived assets depend on the expected path of prices and policy over the life of the asset. This is particularly important for the conduct of monetary policy, which operates dynamically with the specific goal of managing demand, and hence, investment through inflation expectations. Indeed, a growing literature establishes that higher expected inflation in the near future substantially increases investment (Coibion, Gorodnichenko, and Ropele 2020; Ropele, Gorodnichenko, and Coibion 2024; Kumar, Gorodnichenko, and Coibion 2023). However, investment in long-lived asset depends on more than just next-period beliefs—the relevant object is how the full term structure of inflation expectations affects investment decisions in the present. We provide the first causal estimates of this object. The semi-elasticity of the investment rate with respect to expected inflation nearly doubles as the forecast horizon extends from six months to several years, indicating that existing estimates capture roughly half the investment response and that the term structure of expectations is a first-order determinant of how inflation transmits to capital formation.

The rising horizon profile points to a specific economic mechanism. When firms have the option of financing investment with fixed-rate nominal debt, higher expected inflation erodes the real burden of future payments. This effect accumulates: the further out the expectation horizon, the more future payments are affected, generating a rising investment response with the expectation horizon. This is a Mundell (1963)-Tobin (1965) channel operating through the firm's debt structure. Under that channel, the data should bear two additional signatures beyond a rising investment semi-elasticity. First, since tangibles are typically easier to finance externally than intangibles (Rampini and Viswanathan 2013; Falato et al. 2022), we should observe a distinctly higher response for the former. Second, the effect should depend on how much nominal debt firms carry and at what maturity, because that determines how much firms stand to gain from the erosion of real debt burdens.

We test these predictions using administrative data on Italian firms. Italy provides a natural setting to study the relationship between the term structure of inflation expectations and investment. A significant minority of bank loans to firms are at fixed rates (Core et al. 2025), and more than 50% of newly originated loans in 2022–2023 were issued at fixed rates (Vilerts et al. 2025). To test whether this debt structure mediates the investment response to expected inflation, we link firm-level balance sheet data from Cerved to the Bank of Italy's Survey of Inflation and Growth Expectations (SIGE), which elicits inflation forecasts from a representative sample of Italian firms at several horizons ranging from six months to three-to-five years. Crucially, SIGE contains a randomized information provision experiment: a randomly selected subset of firms is repeatedly shown the latest official inflation data before stating their expectations, while a control group receives no information. This design generates exogenous variation in beliefs at each horizon, allowing us to estimate the causal horizon profile of investment responses.

To identify the causal effect of inflation expectations on investment at each horizon, we instrument beliefs with the randomized information treatment. Simply regressing investment on expected inflation at future horizons would be inappropriate because it would confound the causal effect with selection. Firms that rely more heavily on debt financing are better informed about inflation and form different expectations for structural reasons.[1] The randomized information experiment breaks this link by generating variation in beliefs that is orthogonal to firm fundamentals. We regress the investment-to-asset ratio on expected inflation at each horizon, with firm and time fixed effects, using a sign-adjusted treatment indicator as the instrument. The sign adjustment interacts the treatment dummy with the sign of the firm's prior forecast error, ensuring that the information consistently nudges beliefs toward the truth. The treatment does not move expectations about other macroeconomic outcomes and the first stage is strong, with F-statistics exceeding 100 in every specification.

We confirm all three predictions of the financing channel. The investment semi-elasticity with respect to expected inflation rises monotonically at every horizon from six months to three-to-five years, from 0.22 to 0.43. This response is driven almost entirely by tangible capital, with the tangible response roughly four times the intangible response at the same horizons. The effect varies with debt structure in the way the mechanism predicts: firms with more long-term debt respond more strongly, with the marginal effect near zero for firms in the bottom half of the long-term debt distribution and large and statistically significant for those in the upper quartiles. The effect is also non-monotonic in leverage, strongest for moderately leveraged firms, consistent with the financing channel weakening at the extremes. Moreover, our survey data shows that a one percentage point rise in long-run inflation expectations is associated with a 5.2 percentage point increase in the probability that a firm raises its nominal investment expenditures, confirming that firms respond rationally to the anticipated erosion of real debt burdens.

Competing explanations struggle to jointly match the rising profile of semi-elasticities and its concentration in tangible assets. The most natural alternative—that firms accelerate investment when they expect costs to rise—predicts the opposite horizon profile, since the urgency to pull forward spending is strongest for near-term price changes. Sticky discount rate models (Fukui, Gormsen, and Huber 2024) fail similarly. If firms are slow to adjust their nominal discount rate when inflation expectations rise, the real rate temporarily falls, stimulating investment. But the effect is strongest at short horizons and decays as firms adjust—again predicting a declining pro-

1. (Qi and Ropele 2026) use Italian data to show that firms' financing structure shapes their attention to inflation, as firms that rely more heavily on bank credit are better informed about inflation and make smaller forecast errors.

file. While sticky discount rates may operate alongside our financing mechanism, they cannot be the primary explanation: as a pure valuation channel, the framework offers no reason for the tangible-intangible wedge.

The classic money illusion hypothesis (Modigliani and Cohn 1979) fails for a different reason. It posits that managers incorrectly discount real cash flows with nominal discount rates rather than real rates. Consequently, higher inflation expectations lead to higher discount rates, which causes a decline in investment. In contrast, we find a robust positive response, and our survey data confirms that firms increase, rather than decrease, their nominal investment expenditures. This valuation-error framework fails to explain either the rising horizon gradient or the four-to-one gap between asset types. Our results are instead uniquely consistent with a financing channel centered on pledgeability and fixed-rate debt maturity.

We formalize this channel in a dynamic model with a debt maturity ladder and pledgeability gap. The model yields a sufficient statistic, $W(H)$, that aggregates the firm's debt structure—maturity distribution, amortization, refinancing hazard, and the share of fixed-rate lending—into a single measure of how a horizon-H belief shift reduces the user cost of capital. $W(H)$ makes precise which firms and economies are most exposed to the channel: those with longer maturity, higher fixed-rate shares, and slower amortization. Because $W(H)$ is determined by observable features of the credit market, the framework implies that the strength of the investment channel varies systematically across economies and over time with the structure of lending. This variation is empirically relevant: fixed-rate debt is prevalent across the euro area (Core et al. 2025; Vilerts et al. 2025) and the United States (Guo 2025).

Our results have implications for monetary policy. The investment channel of inflation expectations loads primarily on long-horizon beliefs, implying that anchoring near-term expectations alone captures less than half the margin that moves capital formation. The term structure of inflation expectations, not just their level, is a relevant consideration for the design of forward guidance and expectations management. At the same time, the financing channel raises a compositional concern: because only pledgeable assets benefit directly from the erosion of real debt burdens, the mechanism systematically favors tangible over intangible investment. To the extent that intangible capital is central to long-run productivity growth (Corrado, Hulten, and Sichel 2009; McGrattan 2020; Crouzet and Eberly 2021), the same channel that strengthens the investment response to inflation expectations may tilt the composition of capital formation in ways that warrant attention.

Related Literature. This paper contributes to three main strands of literature.

First, we contribute to the literature on firm expectations and investment.[2] Coibion, Gorod-

2. There is also a growing literature that documents how firms form expectations about inflation and other

nichenko, and Ropele (2020) and Kumar, Gorodnichenko, and Coibion (2023) document that inflation expectations affect firm investment, though with mixed evidence on magnitudes and mechanisms.[3]. Our contribution is to provide the first causal estimates of the *full horizon profile* of these responses, showing that investment semi-elasticities rise sharply with the forecast horizon, and to document that responses are concentrated in tangible rather than intangible capital. This horizon-asset-type pattern provides a sharp empirical target for distinguishing between competing theories of how inflation beliefs affect investment.

Second, we contribute to the corporate finance literature on debt structure and real activity. A substantial literature examines how debt maturity and interest rate fixation affect firm responses to monetary policy and inflation shocks (Ippolito, Ozdagli, and Perez-Orive 2018; Gurkaynak, Karasoy-Can, and Lee 2022; Core et al. 2025), with recent work showing that the fraction of debt maturing at the time of a shock is a key determinant of investment sensitivity (Almeida et al. 2012; Jungherr et al. 2024). More broadly, firm financial constraints generate substantial heterogeneity in responses to monetary shocks (Ottonello and Winberry 2018; Jeenas 2023; Cloyne et al. 2023). Our financing channel identifies the specific dimensions of debt structure that matter for the expectations channel: the share of fixed-rate lending and its maturity determine the magnitude of the investment response, while the pledgeability of assets determines its composition across tangible and intangible capital (Rampini and Viswanathan 2013; Falato et al. 2022).

Third, we contribute to the literature on inflation's real effects through financial channels. The classic debt-deflation mechanism, whereby unexpected inflation redistributes wealth by revaluing nominal contracts, was formalized by Doepke and Schneider (2006) for household balance sheets. Gomes, Jermann, and Schmid (2016) and Guo (2025) extend this channel to firm investment, with Guo (2025) showing in a heterogeneous firm GE model that a one percent inflation surprise raises aggregate investment by 0.83% in the United States. These papers study ex-post wealth redistribution: realized inflation surprises devalue existing liabilities. Our channel is complementary but distinct. Anticipated future inflation affects ex-ante investment decisions by changing the expected real cost of future debt service. Both channels operate through the same balance sheet objects, but ours adds a term structure dimension: which horizon of expectations matters for

macroeconomic variables. Starting with the seminal contribution of Coibion, Gorodnichenko, and Kumar (2018), which provided some of the first systematic evidence based on survey data, subsequent research has highlighted that firms' expectations often differ substantially from those of professional forecasters and households. For instance, Andrade et al. (2022) show that firms' inflation expectations are strongly influenced by their exposure to firm-specific shocks and local economic conditions, while in the case of SIGE data Bottone, Tagliabracci, and Zevi (2022) and Riggi and Tagliabracci (2022) show that the sector of activity is a key feature for pricing decisions, but not so important for inflation beliefs. More generally, Weber et al. (2022) and Candia, Coibion, and Gorodnichenko (2022) provide comprehensive reviews of the literature on how firms acquire, process, and update macroeconomic information.

3. In the case of SIGE data, see also Grasso and Ropele (2018). For a discussion on the effects of inflation expectations on firms' pricing and labor demand decisions, see also Rosolia (2024)

investment depends on the maturity of the firm's debt.

2 Conceptual Framework

Before turning to the data, we develop a stylized two-period model to clarify the core economic mechanism and generate testable predictions. The model provides sharp intuition for our main empirical findings, namely that tangible investment responds more strongly than intangible investment to inflation expectations, and that this response is mediated by the firm's financial condition. It also highlights the need for a richer, multi-period framework (developed in Section 6) to explain the horizon profile of these responses.

2.1 A Two-Period Model

A risk-neutral firm operates over two periods $t = \{0, 1\}$. At $t = 0$, the firm chooses investment in tangible capital, I_T, and intangible capital, I_I. At $t = 1$, it produces output and repays its debt. The firm produces with a technology $Y_1 = f(K_T, K_I)$, where $K_T = I_T$ and $K_I = I_I$. We abstract from depreciation and assume the two capital types are complementary.

Following Rampini and Viswanathan (2013), the model's key friction is a difference in pledgeability. Tangible capital can be purchased with nominal debt B borrowed at a gross nominal interest rate $1 + i$. On the other hand, intangibles are difficult to collateralize and must be financed internally from the firm's initial liquid assets, denoted as M_0. The firm's budget constraint is therefore $I_T = B$ and $I_I \leq M_0$. We assume that the firm is financially constrained, investing all internal funds in intangibles such that $I_I = M_0$.

The sharp bifurcation in financing treatment follows an intangible literature, which highlights the lack of secondary markets for many types of intangibles (Crouzet et al. 2022; Haskel and Westlake 2018). Without a secondary market, there is no ability to collateralize intangible assets, which often requires them to be internally financed. While this is of course a convenient fiction in the model because some types of intangibles can be externally financed, we set up the financing distinction between tangibles and intangibles to highlight the core mechanisms.

The firm chooses its level of tangible investment I_T to maximize the real value of its expected first period profit. This profit is its output minus the real value of its nominal debt obligation. Let π^e be the expected inflation rate between the two periods, so the firm solves

$$\max_{I_T} f(I_T, M_0) - \frac{(1 + i)I_T}{1 + \pi^e}.$$

The first-order condition that defines the optimal investment choice is

$$f_T = \frac{1+i}{1+\pi^e} \tag{1}$$

Since f is concave in K_T, higher expected inflation stimulates investment because it makes debt cheaper.

2.2 Core Predictions

The simple framework generates three sharp, testable predictions.

1. Tangible-Intangible Wedge. An increase in expected inflation should stimulate tangible investment but have no direct effect on intangible investment, leading to a wedge between their responses to expected inflation. Higher expected inflation erodes the real burden of nominal debt, which directly lowers the user cost of tangible capital. Since intangible investment is internally financed and the firm is constrained, it does not respond directly. This financing asymmetry is the source of the predicted wedge.

2. Heterogeneity by Financial Condition. The financing channel makes sharp predictions about leverage. For low-leverage firms, there is little nominal debt to inflate away, so the channel is weak. As leverage rises, the marginal benefit of eroding fixed nominal payments increases. But at high leverage, rising credit spreads and financial distress costs offset the benefit. The model therefore predicts a non-monotonic, inverted-U-shaped relationship between leverage and the investment response, with the effect strongest for moderately leveraged firms.

The model's predictions for liquidity are more ambiguous. A substitution effect suggests that liquid firms rely less on external debt, attenuating the channel. But a complementarity effect operates in the opposite direction: liquidity finances intangible investment, raising the marginal product of tangible capital and potentially amplifying the response. The net effect is an empirical question.

3. Silence on the horizon profile. The model cannot explain why long-term inflation expectations might matter more than short-term ones. This is a deliberate feature of the two-period setup: it is analytically equivalent to an infinite-horizon model where all debt is either floating-rate or has a single-period maturity. In such a world, only next-period inflation affects the real cost of debt, and the forecast horizon is irrelevant. This limitation cleanly isolates the core financing channel while simultaneously demonstrating that an additional ingredient—debt maturity—is required to explain the rising horizon profile of investment responses we document empirically.

We resolve this in Section 6, where we introduce a multi-period debt ladder to show that firms with long-maturity, fixed-rate debt can lock in today's rates for multiple periods, thus amplifying the effect of distant inflation expectations.

We now test these theoretical predictions using a unique dataset linking Italian firms' inflation expectations to their realized investment behavior.

3 Data

Our analysis combines two rich micro datasets: a quarterly survey of firms' inflation expectations and annual firm-level balance sheets.

3.1 The Survey of Inflation and Growth Expectations

The Survey of Inflation and Growth Expectations (SIGE) asks firms about their expectations about a number of macroeconomic and idiosyncratic variables, but most importantly, about (consumer) price inflation. SIGE has been run quarterly by the Bank of Italy since 1999 on a nationally-representative sample of firms operating in manufacturing, (non-financial) services, and construction sectors with at least 50 employees. The number of participating firms has increased over time, reaching around 1500 in recent years. The composition of the sample is stratified according to three characteristics: sector, size class in terms of number of employees, and geographical area based on firm's administrative headquarters.

Along with other macroeconomic and firm-specific expectations, companies are asked to provide their inflation forecasts for six months, one year, two years, and the average between three and five years ahead. This question is the backbone of our empirical exercises. However, the survey also includes data from a randomised controlled trial (RCT) in which firms are divided into groups. Roughly two thirds of all firms in the survey receive publicly available information on the latest inflation rate in both Italy and the Euro area, while the remainder are told nothing. Once a firm is assigned a specific treatment, then it is treated for as long as it participates in the survey. Other studies, including Coibion, Gorodnichenko, and Ropele (2020) and Bottone, Tagliabracci, and Zevi (2022), rely on the SIGE data to investigate other questions while also using the information treatment to generate an instrument that yields plausibly exogenous variation in inflation expectations.

In the case of the inflation-treated group, the wording of the question is as follows:

> "*In [previous month], consumer price inflation measured by the 12-month change in the Harmonized Index of Consumer Prices was [X.X]% in Italy and [Y.Y]% in the Euro area.*

What do you think it will be in Italy in [6 months, 1 year, 2 years, on average between 3 and 5 years]?"

while the question for the participants in the control group is simply specified as:

"*What do you think it will be in Italy in [6 months, 1 year, 2 years, on average between 3 and 5 years]?"*

The availability of these expectations varies depending on the horizon considered: those at 12 months have been available since the very beginning of the survey, while those at 24 months were introduced in 2009; those at 6 months in 2010Q4 and those between 3 and 5 years in 2014Q1. Given our focus on medium-term expectations, we restrict our sample period to the years 2014Q1-2023Q4.

The survey not only gathers firms' inflation forecasts but also collects, among others, their beliefs on aggregate economic conditions, their own business conditions, future investments, demand for their products, and input costs.

3.2 Balance Sheets and Income Statements

Cerved Group S.p.A., a leading information provider in Italy, provides detailed information on balance sheet and income statements (Company Accounts Data Services, CADS) for almost all Italian limited liability companies since 1993. The information is drawn from official data recorded at the Italian Registry of Companies and from financial statements filed with the Italian Chambers of Commerce. All data are self-reported annually.

We limit our focus to variables traditionally associated with investment. Our two most important variables are investments in tangible and intangible capital. The former are flows of expenditures on machinery purchases, equipment and tools related to the production of the company's goods or services, or IT tools; carry out civil and plant engineering works, and renovation or adaptation of buildings. The latter are expenditures on start-up costs (feasibility studies, executive projects) incurred, the purchase of licenses and patents, and costs incurred for research, development and advertising, from which long-term effects are expected.

In our empirical analysis we scale investment by total assets following standard practice in the corporate finance literature (Falato et al. 2022; Rauh 2006; Hennessy and Whited 2007). This choice is essential for our empirical strategy for three reasons. First, our sample includes many small, privately-held Italian firms whose accounting practices for capital, especially intangible capital, are highly heterogeneous and non-standard. Book values are severely distorted by differences in accounting practices (Peters and Taylor 2017). These accounting choices do not reflect the economic concepts K_T and K_I in our model and would inject substantial measurement error into the denominator, with the severity varying systematically by firm size and accounting sophistication. Second, total assets at time t are predetermined relative to future investment decisions, providing a stable measure of firm scale. Third, our financing channel operates through collateral capacity, which encompasses the firm's entire balance sheet, not just recorded capital stocks. Lenders assess borrowing capacity based on total pledgeable assets, including inventory, receivables, and other balance-sheet items beyond PP&E (Property, Plant, and Equipment) and recorded intangibles. Total assets therefore provide the theoretically appropriate measure of the collateral base that determines debt capacity.

We also have measures of liquidity, leverage, and debt which are comparable to typical Compustat variables in the United States. We leverage these to test the basic mechanism's predictions with respect to heterogeneity. However, because many companies in our sample are not publicly traded, we cannot construct a measure of Tobin's q.

A key challenge is merging the quarterly survey with the annual balance-sheet data. To ensure that expectations can plausibly influence annual investment, we impose a timing assumption: inflation information acquired in the current or immediately preceding quarter cannot affect current-year investment decisions. Accordingly, we shift the survey data two quarters forward and construct annual inflation expectations as the average of the quarterly observations. We then merge the survey and balance-sheet data by firm identifier and year. Tables A.1–A.2 report summary statistics for the resulting dataset. An alternative is to use last-quarter expectations from the previous year, but this approach has two main drawbacks: (i) it places undue weight on potential outliers, and (ii) it ignores information acquired in the first half of the year that firms likely incorporate into their decisions.

3.3 Corporate Borrowing in Italy

Euro area firms rely primarily on bank financing for external funds, in contrast to the United States where capital markets play a larger role (Core et al. 2025). Within the euro area, there is substantial cross-country heterogeneity in the structure of business loans. Michelangeli and Piersanti (2025) document that the share of adjustable-rate (floating) loans ranges from approximately 30% in Germany, France, and Belgium to over 80% in Portugal and some smaller euro area economies. Loan maturity also varies considerably, with 50-90% of business loans having maturities exceeding one year depending on the country.

Italy occupies a middle position in this distribution. For instance, in 2021 approximately 20% of business loans to Italian non-financial corporations carry fixed interest rates, with the share rising to about 40% for long-term loans—close to the euro area median (Core et al. 2025). The remainder are priced at floating rates with reset frequencies of three, six, or twelve months. About half of loans in Italy have a maturity longer than one year. The prevalence of both fixed and floating-rate debt, combined with variation in maturity and leverage across firms, provides the cross-sectional variation we exploit to test our mechanism.

Core et al. (2025) and Michelangeli and Piersanti (2025) document that these loan characteristics have important implications for monetary policy transmission across the euro area. In the short term floating-rate loans weaken the disinflationary impact of rate hikes as firms raise prices to offset higher borrowing costs, while fixed-rate firms face no immediate cost increase. Longer loan maturities dampen business cycle fluctuations by limiting the fraction of loans repriced each period. We test analogous heterogeneity with respect to inflation expectations later.

4 Identification Strategy

This section outlines the empirical strategy we use to test the predictions derived from our conceptual framework. Specifically, we estimate the semi-elasticity of tangible and intangible investment ratio with respect to inflation expectations at different horizons and examine how these responses vary with firms' financial conditions.

Our primary specification is an instrumental variable (IV) regression of investment on inflation expectations, including firm and time fixed effects:

$$Inv_{i,t+1} = \alpha_i + \theta_t + \psi \mathbb{E}_{it}\pi_{t+H} + \boldsymbol{\beta}' X_{it} + \eta_{it} \tag{2}$$

where $Inv_{i,t+1}$ is the investment-to-asset ratio for firm i in year $t+1$, $\mathbb{E}_{it}\pi_{t+H}$ is the firm's average expected inflation at horizon H, and X_{it} is a vector of controls including the firm's outlook on macroeconomic conditions and its own credit access. The coefficient of interest, ψ, captures the causal effect of a one percentage point increase in inflation expectations on the investment rate. Standard errors are clustered at the firm × quarter level. The first stage consists of the following specification:

$$\mathbb{E}_{it}\pi_{t+H} = \alpha_i + \theta_t + \phi \widetilde{Treat}_{it} + \boldsymbol{\beta}' X_{it} + \varepsilon_{it} \tag{3}$$

To establish a causal link, we use an instrumental variable approach that leverages the randomized information treatment embedded in the SIGE survey. Specifically, we construct a sign-adjusted instrument:

$$\widetilde{Treat}_{it} = \text{Treat}_i \times \text{Sign}(\text{Forecast Error}_{it-1})$$

where Treat_i is the treatment dummy and the second term is the sign of the firm's prior one-year forecast error. This interaction operates through a simple mechanism: providing the latest inflation data consistently "nudges" firms' beliefs toward the truth. Firms that previously overestimated inflation (positive error) are nudged to lower their forecasts, while those that underestimated (negative error) are nudged to raise them.[4] A preferable instrument would rely on the sign of forecast revisions, but as SIGE does not collect prior and posterior beliefs, such revisions cannot be constructed. We therefore use the sign of forecast errors as the closest available proxy: because forecast errors reveal whether firms previously over- or under-predicted inflation, they naturally indicate the direction in which firms are nudged to review their expectations when presented with new information. The instrument therefore generates plausibly *exogenous* variation in inflation expectations that is, by construction, monotonic.[5]

This instrument satisfies the two key conditions for validity:

1. **Relevance:** The instrument must be highly correlated with firms' inflation expectations. Figure A.1 provides a clear visual confirmation, showing that the information treatment creates a persistent wedge between the average inflation expectations of the treatment and control groups, particularly during the volatile period after 2021. The formal results in Table 1 confirm this with overwhelming statistical power. Across all four forecast horizons, the first-stage F-statistics are exceptionally high, ranging from over 166 for the 3-to-5-year horizon to nearly 440 for the 6-month horizon. This indicates that our sign-adjusted instrument is highly relevant and avoids any concerns about weak instrument bias.

2. **Exclusion Restriction:** The instrument must affect investment only through its effect on inflation expectations. We believe this condition is met because the treatment is randomly assigned and provides a narrow, quantitative piece of public information (a single consumer inflation number) unlikely to contain news about future demand or productivity. Figure A.2d provides strong supporting evidence, showing that the treatment has no discernible effect on firms' expectations for their own business conditions, aggregate demand, or employment. This placebo test suggests the instrument does not operate through a separate optimism or sentiment channel.

4. Coibion, Gorodnichenko, and Ropele (2020)'s approach is to multiply the dummy for the treatment variable by the level of inflation associated with that treatment, creating a time-varying measure of the treatment given to a firm each quarter. Rosolia (2024) criticizes this approach as the lack of information on prior expectations does not guarantee that the direction of the revision (between prior and posterior) is the same for all units and therefore the monotonicity assumption embedded in the conventional instrumental variable (IV) approach could potentially be violated. Tables 1, B.2, B.3 and B.4 in the Appendix show the results using the Coibion, Gorodnichenko, and Ropele (2020)'s approach, highlighting similar qualitative results.

5. Our identification relies solely on the randomized assignment of information, which induces *exogenous* variation in firms' inflation expectations independent of their priors, attention, or investment opportunities. Using the numerical level of the communicated forecast as a continuous treatment intensity, by contrast, would mix this experimental variation with endogenous heterogeneity in how much firms choose to incorporate the signal-variation that is correlated with investment fundamentals. Because the theory's causal object is the belief change itself, not the specific number firms are told, the treatment indicator delivers clean identification, while an intensity measure would reintroduce the very selection we eliminate through randomization.

Table 1: First Stage Regressions

	$\mathbb{E}\pi_{6m}$	$\mathbb{E}\pi_{1y}$	$\mathbb{E}\pi_{2y}$	$\mathbb{E}\pi_{3-5y}$
	(1)	(2)	(3)	(4)
$\mathbf{1}(Treat = 1)\times\mathbf{1}(FE < 0)$	-0.232***	-0.218***	-0.192***	-0.184***
	(0.000)	(0.000)	(0.000)	(0.000)
$\mathbf{1}(Treat = 1)\times\mathbf{1}(FE \geq 0)$	0.893***	0.799***	0.642***	0.533***
	(0.000)	(0.000)	(0.000)	(0.000)
$\mathbf{1}(FE \geq 0)$	-0.685***	-0.636***	-0.584***	-0.562***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	9223	9223	9223	9223
F	439.881	360.404	243.624	166.524
Firm, Time FE	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes: The table contains results of the first stage of IV-2SLS regression: $\mathbb{E}_{it}\pi_{t+H} = \alpha_i + \theta_t + \phi\widetilde{Treat}_{it} + \boldsymbol{\beta}'X_{it} + \varepsilon_{it}$. Inflation expectations with (1) 6-month, (2) 1-year, (3) 2-year, and (4) 3-5 year horizon are regressed on our IV, $\widetilde{Treat}$. $\widetilde{Treat}$ is made of treated firms that update their expectations downwards ($\mathbf{1}(Treat = 1)\times\mathbf{1}(FE < 0)$), as well as upwards ($\mathbf{1}(Treat = 1)\times\mathbf{1}(FE \geq 0)$). The first two rows capture this group. Furthermore, we include a dummy for upwards revisions, $\mathbf{1}(FE \geq 0)$. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Given that our instrument is both relevant and valid, the resulting IV estimates can be interpreted as a Local Average Treatment Effect (LATE), capturing the causal effect of inflation expectations on investment for the subpopulation of firms that update their forecasts in response to the information they receive. This robust identification strategy allows us to provide the first causal estimates of the full horizon profile of investment responses.

Before turning to results, our estimation approach requires clarification. For each forecast horizon $H \in \{6m, 1y, 2y, 3\text{-}5y\}$, we estimate a separate IV regression of investment on $\mathbb{E}_{it}\pi_{t+H}$, without controlling for expectations at other horizons when estimating the effect at horizon H. Rather, we estimate the total causal effect of shifting beliefs at horizon H, allowing the full term structure of expectations to adjust as firms naturally would when updating their forecasts. This is the standard approach in local projection IV, where a single shock traces out dynamic responses at multiple horizons. The IV estimator for each horizon is $\hat{\psi}_H = \pi_H^{RF} / \pi_H^{FS}$, where both the reduced-form effect on investment and the first-stage effect on beliefs are horizon-specific. Since both numerator and denominator vary with H, there is no mechanical relationship between the strength of the first stage and the magnitude of the IV estimate. We discuss this logic further in Appendix A.

5 Main Results

This section tests the predictions derived from our conceptual framework using the IV strategy outlined above. We first document the aggregate investment response and its decomposition, which reveals a large tangible-intangible wedge and a rising horizon profile of semi-elasticities. We then provide strong evidence for the financing channel by testing for heterogeneity based on firms' financial conditions. Finally, we discuss how this full body of evidence allows us to distinguish our proposed mechanism from alternative theories.

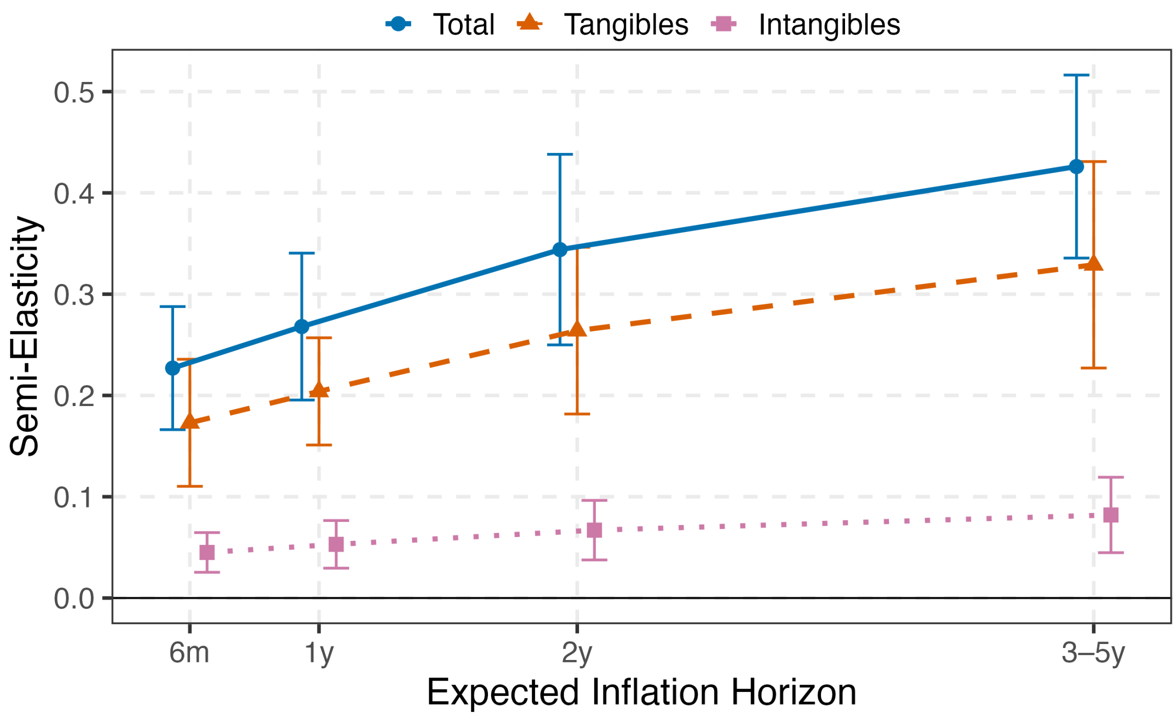
5.1 The Main Empirical Patterns: The Wedge and the Horizon Profile

As a first step, we estimate the effect of inflation expectations on the total investment-to-asset ratio across the four forecast horizons firms are asked about in SIGE. Figure 1 plots these semi-elasticities. The results show a clear, steeply rising profile: a one percentage point increase in six-month inflation expectations raises total investment by 0.23 percentage points, an effect that nearly doubles to 0.43 percentage points for a shock to three-to-five-year expectations.

While this confirms a strong link between long-term expectations and aggregate investment, this total effect masks two starkly different and economically important patterns. To understand the underlying mechanism, we must decompose investment into its tangible and intangible components.

First, there is a large and persistent wedge between the two types of capital. At every horizon, the coefficient for tangible investment is roughly four times larger than for intangible investment. This pronounced asymmetry provides strong causal evidence for Prediction 1 of our conceptual framework and is a hallmark of a financing channel that operates through pledgeable assets.

Figure 1: The Horizon Profile of Investment Semi-Elasticities



Notes: We separately regress the total investment rate, the tangible investment rate, and the intangible investment rate on instrumented inflation expectations, using the following specification: $Inv_{i,t+1} = \alpha_i + \theta_t + \psi \mathbb{E}_{it}\pi_{t+H} + \boldsymbol{\beta}' X_{it} + \eta_{it}$. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level. Full results are in Tables B.2, B.3, and B.4.

The second pattern confirms the rising profile of investment responses. Moreover, it illustrates exactly what our simple two-period model was designed to highlight as a puzzle. Our finding of a steeply rising profile thus aligns with Prediction 3 of our framework: that a simple model with single-period debt is silent on the horizon profile, and that an additional ingredient is required to explain why long-run expectations matter more. This consideration motivates the richer, multi-period model we develop in Section 6, which demonstrates that debt maturity is the key mechanism that amplifies the effect of distant inflation expectations.

A potential concern is that the tangible-intangible wedge simply reflects mechanical scaling: tangible investment rates are roughly five times larger than intangible rates in levels, so perhaps they mechanically respond more to any shock. This reasoning confuses levels with slopes. Our coefficients measure how much the investment rate changes when expected inflation rises by one percentage point. This response is independent of the average investment rate. An asset type with a high baseline investment rate could respond weakly to inflation shocks, while an asset type with a low baseline rate could respond strongly. We find that tangible investment is four times more responsive, which reflects a genuine difference in how these assets react to inflation expectations, consistent with our financing channel in which only tangible capital benefits directly from cheaper debt financing.

5.2 Heterogeneity by Financial Condition

We now test Prediction 2 by examining how the investment response varies with firms' financial conditions. Because the mechanism operates through the erosion of the real burden of nominal debt service, it applies first and foremost to assets that are externally financed. In practice, this means that tangible capital—which can be pledged as collateral and may be predominantly debt-financed—is the economically relevant margin: higher expected inflation relaxes financing constraints by reducing the real cost of debt and lowers the user cost of tangible investment. By contrast, intangible capital is typically funded from internal cash flows and provides little collateral value, implying only weak and indirect responses. For this reason, the heterogeneity predictions for tangibles provide the sharpest test of the financing channel.

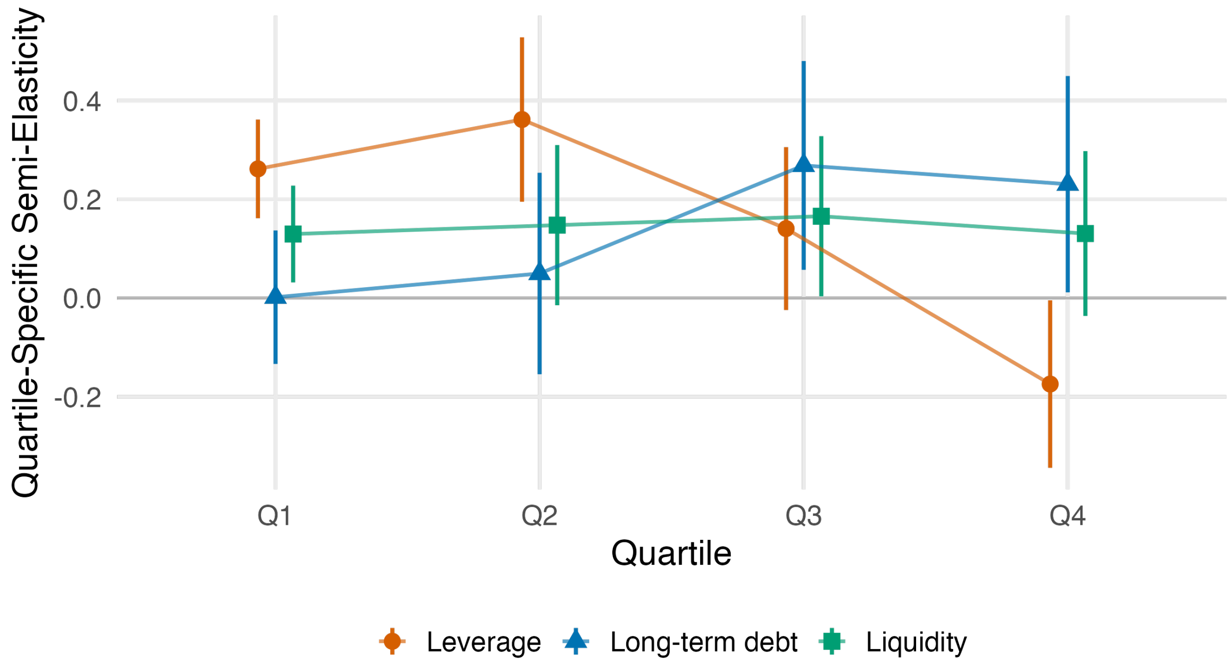
Figure 2 plots the resulting marginal effects of long-horizon inflation expectations on tangible investment for each quartile of leverage, long-term debt share, and liquidity. For quartile Qk ($k = 2, 3, 4$), the plotted value equals the baseline semi-elasticity for $Q1$ plus the interaction coefficient for Qk, so each point measures the responsiveness of tangible investment to a one-percentage-point increase in three-to-five-year inflation expectations within that segment of the balance-sheet distribution. Vertical lines show 95% confidence intervals. We now discuss how the shape of these marginal effects across quartiles provides targeted tests of the financing channel.[6]

Leverage. The financing channel predicts an inverted-U: when leverage is very low, firms have little nominal debt to erode, so the effect is small; as leverage rises, the marginal benefit of inflating away fixed nominal payments increases; at very high leverage, rising spreads and distress risk offset the benefit. In Figure 2, the quartile profiles for tangibles follow this pattern: the marginal effect peaks for *moderately* levered firms (Q2–Q3) and falls sharply in Q4, where the point estimate is close to zero or negative. This hump shape is a distinctive signature of a debt-financing mechanism.

Long-term debt. The model's term-structure implication is that the response should be concentrated among firms able to lock in nominal rates. Consistent with this, Figure 2 shows a near-monotonic sorting by maturity: the marginal effect is near zero for firms with little long-term debt (Q1–Q2) and becomes large and statistically significant in Q3–Q4.

6. The full results for leverage, debt, and liquidity are in Tables B.10, B.11, and B.9, respectively. We also plot marginal effects for total and intangible capital in Appendix Figures B.2 and B.1.

Figure 2: Marginal Effects by Financial Condition (Tangible Investment)



Notes: Notes. Each point is a quartile-specific semi-elasticity of tangible investment with respect to long-horizon inflation expectations (pp of assets per 1 pp increase in $\mathbb{E}\pi_{3-5y}$). For quartile Q_k ($k = 2, 3, 4$), the effect equals the baseline slope for $Q1$ plus the Qk interaction from the IV regression. Quartile $Q1$ is omitted from the plot for readability. All specifications include firm and time fixed effects and controls for macroeconomic outlook and credit access; standard errors are clustered at the firm×quarter level. Full results are in Tables B.10, B.11, and B.9.

Liquidity. Theory admits two offsetting forces: a substitution effect (cash reduces reliance on external debt, weakening the channel) and a complementarity effect (cash finances intangibles that raise the marginal product of tangibles, strengthening it). The empirical profile in Figure 2 is correspondingly flat: effects are similar in Q2 and Q4, with a modest peak around Q3, and confidence intervals often overlap. This lack of a clear monotone gradient is consistent with the two forces largely offsetting in the cross-section.

Total and intangible investment. Figures B.1 and B.2 report the corresponding marginal effects forintangible and total investment. The total profile largely mirrors the tangible results, consistent with tangibles comprising the majority of capital formation and driving the aggregate response. By contrast, the effects for intangibles are uniformly small, often imprecise, and show no systematic sorting by leverage or debt maturity. This is consistent with the pledgeability gap in our mechanism: because intangibles are rarely financed with nominal debt, they do not benefit directly from higher expected inflation. Their modest movements reflect only indirect complementarities with tangibles. The joint evidence, namely that that tangibles respond strongly and selectively while intangibles respond weakly, underscores that the transmission mechanism likely operates through collateralizable capital.

5.3 Interpreting the Evidence

Our empirical analysis has established three key stylized facts: (1) a large and persistent wedge between the investment responses of tangible and intangible capital; (2) a steeply rising horizon profile of investment semi-elasticities, driven by tangibles; and (3) a response that is non-monotonic in leverage and increasing in the share of long-term debt. We now argue that this full set of patterns points uniquely to a Mundell-Tobin financing channel by ruling out alternative explanations.

Money Illusion (Modigliani and Cohn 1979)

First, we test whether our results could be explained by "money illusion," the hypothesis of Modigliani and Cohn (1979) that firms fail to distinguish between nominal and real values. This hypothesis posits that managers incorrectly use the higher nominal interest rates that accompany higher inflation to discount real cash flows, artificially depressing the net present value of investment projects.

This leads to a sharp, testable prediction: firms suffering from money illusion should decrease their real investment, and therefore either decrease or only modestly increase their nominal investment expenditures, in response to higher inflation expectations. In contrast, our financing channel predicts the opposite. A rational firm recognizes that higher expected inflation lowers the real cost of its nominal debt, making investment more attractive. To increase investment, the firm must increase its nominal investment spending.

Our survey data allows for a direct test of these competing hypotheses, as it asks firms about their plans to change their nominal investment expenditures. As a sanity check, Table B.1 shows that a one percentage point rise in long-run inflation expectations is associated with a 5.2 percentage point increase in the probability that a firm will raise its nominal investment expenditures. This result is a clear rejection of the money illusion hypothesis. Firms in our sample act in a manner consistent with rational behavior, increasing their nominal spending in response to higher inflation expectations.

The Sticky Discount Rate Channel (Fukui, Gormsen, and Huber 2024)

Consider the core of the sticky discount rate channel. Firms use a nominal discount rate and, with some Calvo probability, adjust it for inflation. A shock to inflation expectations temporarily lowers the real rate, stimulating investment. But because firms are expected to eventually adjust, the effect on the real discount rate is largest for near-term shocks and decays as the forecast horizon lengthens. This implies a profile of investment semi-elasticities that *declines* with the horizon—the opposite of what we find. Moreover, the sticky discount rate story is primarily about *valuation*, not finance. A valuation channel should affect all long-term projects similarly, offering no clear reason for the four-to-one tangible–intangible wedge we document. Sticky rates thus fail on both facts simultaneously.

This does not mean the channel is irrelevant. It is plausible that sticky rates play a complementary role, amplifying the overall level of the investment response particularly at short horizons, while our financing channel generates the horizon gradient and the asset-type wedge. But sticky rates cannot be the primary mechanism.

Taking Stock

The empirical results provide strong support for the core predictions of our conceptual framework. We find a large and persistent wedge between tangible and intangible investment, and the investment response varies with firms' financial conditions in ways that are uniquely consistent with a debt-financing channel. However, our findings also confirm the existence of the "horizon profile puzzle" highlighted by our simple two-period model: the investment semi-elasticity rises sharply with the forecast horizon, an effect driven entirely by tangible capital. To formally account for this central empirical fact, we now develop a richer, multi-period model that explicitly incorporates a debt maturity structure, showing how the ability to lock in long-term nominal rates generates the observed horizon profile of investment responses.

6 Model

The empirical results provide strong support for the core predictions of our conceptual framework. We find a large and persistent wedge between tangible and intangible investment, and the investment response varies with firms' financial conditions in ways that are consistent with a debt-financing channel.

However, our empirical findings also reveal a key dynamic pattern that the simple two-period model, by its static nature, cannot explain: the investment semi-elasticity rises sharply with the forecast horizon. This confirms that the model's silence on the horizon profile is not just a theoretical limitation but an empirical puzzle. To formally account for this central finding, we now develop a richer, multi-period model that provides a clear microfoundation for the Mundell (1963)-Tobin (1965) financing channel.

The model is designed to parsimoniously match our three main empirical findings:

1. **A rising horizon profile.** The investment semi-elasticity with respect to inflation expectations increases with the forecast horizon.

2. **A tangible-intangible wedge.** The response of tangible investment is significantly larger than that of intangible investment at all horizons.

3. **Leverage non-monotonicity.** The investment response is hump-shaped with respect to firm leverage.

To that end, we study a partial equilibirum model that formalizes the classic "flight to durables" effect of Mundell (1963) and Tobin (1965), featuring heterogeneous capital and a rich structure for debt.

6.1 Environment

Time is discrete. An infinitely lived firm produces output using tangible capital $K_{T,t}$ and intangible capital $K_{I,t}$ with a weakly concave production technology $f\left(K_{T,t}, K_{I,t}\right)$. We assume that the two capital types are complementary in production ($f_{TI} > 0$). The firm's capital stocks evolve according to the standard law of motion:

$$K_{j,t+1} = \left(1 - \delta_j\right) K_{j,t} + I_{j,t}, \quad \text{for } j \in \{T, I\}. \tag{4}$$

The firm also faces convex costs of adjusting its investment, given by $\Phi_j\left(\frac{I_{j,t}}{K_{j,t}}\right) K_{j,t}$.

To parsimoniously match our empirical targets, we introduce two key ingredients: a *pledgeability gap* between tangible and intangible assets, and a rich *debt maturity ladder* for nominal debt. As we show below, these features generate a single sufficient statistic that maps a horizon-H belief shift into the firm's user cost of capital, and ultimately, into its investment decision.

The Pledgeability Gap. We assume a fundamental financing asymmetry, as in Rampini and Viswanathan (2013). A fraction $\gamma_T \in [0, 1)$ of tangible investment is externally financed with nominal debt, as tangible assets are easily pledgeable as collateral. In contrast, intangible assets are difficult to collateralize, so we assume their external financing share is negligible, $\gamma_I \approx 0$. This leads to the following collateral constraint, where total debt cannot exceed a fraction ν_T of the value of tangible assets:

$$\sum_m B^{\text{fix}}_{m,t} + B^{\text{flo}}_t \le \nu_T p_{T,t} K_{T,t}. \tag{5}$$

The Debt Maturity Ladder. The firm's external financing has a rich structure. First, an exogenous share $\omega \in [0, 1]$ of debt is fixed-rate, while the remainder $(1 - \omega)$ is floating-rate. The nominal coupon on fixed-rate debt includes a credit spread, $i^{\text{fix}}_{m,t} + \sigma_t$, where $\sigma_t = \sigma(L_t)$ is a spread that we assume is weakly increasing and convex in the firm's leverage, L_t, which we define as the ratio of debt to assets.

The fixed-rate portion of the firm's debt is characterized by a maturity ladder with three components:

1. **Maturity Distribution**: The firm's debt portfolio consists of a mix of different loan lengths, described by the probability distribution $\{\Omega(m)\}_{m=1}^{\bar{m}}$.

2. **Amortization**: Each loan of maturity m has an amortization schedule, $a_m(h)$, representing the fraction of principal still outstanding in period h. By definition, $a_m(0) = 1$ and $a_m(m) = 0$. A non-amortizing "bullet" loan, where $a_m(h) = 1$ until maturity, represents a polar case.

3. **Refinancing Hazard**: In any period, loans face an exogenous refinancing hazard, $\rho \in [0, 1)$, reflecting the option to prepay. The probability that a loan survives to period h is therefore $(1-\rho)^h$, which acts as a crucial discount factor on the future benefits of a locked-in low rate.

Beliefs about inflation. Let π_{t+h} denote aggregate inflation between $t + h - 1$ and $t + h$. The firm's beliefs about inflation are summarized by

$$\mathbb{E}_t[\pi_{t+h}] = \bar{\pi} + \ell_t + s_t \exp\{-\kappa h\}$$

The term ℓ_t captures permanent belief shocks, while the term s_t captures shocks that the firm perceives to be transitory. A shock to the level component causes a parallel shift in the entire horizon profile of inflation expectations. In contrast, a shock to the slope component "twists" the curve, as its effect decays exponentially with the horizon h. This two-factor process allows the model to distinguish between persistent news that affects long-run views and temporary news that only impacts short-run forecasts.

That can be seen clearly under the horizon-H loading of a shock in h on H:

$$w_{h|H} = \frac{\partial \mathbb{E}_t[\pi_{t+h}]}{\partial \mathbb{E}_t[\pi_{t+H}]} = \frac{\Delta \ell_t + \Delta s_t \exp(-\kappa h)}{\Delta \ell_t + \Delta s_t \exp(-\kappa H)}$$

This loading, $w_{h|H}$, measures the spillover effect of a belief shock. It answers the question: "If news causes me to update my forecast for horizon H, how much do I also update my forecast for some other horizon h?" The intuition is best understood by considering two extreme cases:

- A Pure "Level" Shock ($\Delta s_t = 0$): if the news is about something persistent (like a change to the central bank's inflation target), a change in the 5-year forecast leads to a one-for-one change in the forecast for all other horizons. The spillover is perfect ($w_{h|H} = 1$).

- A Pure "Slope" Shock ($\Delta \ell_t = 0$): if the news is about something temporary (like a short-term oil price spike), a change in the 6-month forecast will have a rapidly decaying impact on long-term forecasts. The spillover is weak and fades out quickly.

This distinction maps directly to our empirical strategy and the nature of the treatment-induced beliefs. The information treatment provides firms with the latest consumer inflation release—a piece of news about current economic conditions. It is plausible that such news would be interpreted by many firms as a transitory "slope" shock (Δs_t), affecting their near-term forecasts most strongly. Our key identifying assumption is that the treatment's effect on long-run survey responses reflects a relatively larger persistent "level" component ($\Delta \ell_t$) compared to its effect on short-run responses:

Assumption 1 (Level dominance at distant horizons)**.** *Treatment-induced belief shifts satisfy* $\ell_t, s_t \geq 0$ *and do not vanish as* H *grows. Equivalently, the signal rotates beliefs toward level at longer horizons.*

Assumption 1 is economically plausible because some firms interpret the current inflation news as a signal about the persistent, underlying inflation process, causing them to shift their entire forecast curve.

Dividends. Given nominal debt positions $\{B^{\text{fix}}_{m,t}\}_m$ and B^{flo}_t and real capital stocks, period t real dividends are

$$\begin{aligned} d_t = p_t F(K_{T,t}, K_{I,t}) - p_{T,t} I_{T,t} - p_{I,t} I_{I,t} - \sum_{j \in \{T,I\}} \Phi_j(x_{j,t}) K_{j,t} \\ + \sum_m \left(B^{\text{fix}}_{m,t+1} - (1 + i^{\text{fix}}_{m,t}) B^{\text{fix}}_{m,t} \right) + \left(B^{\text{flo}}_{t+1} - (1 + i^{\text{flo}}_t) B^{\text{flo}}_t \right), \end{aligned} \tag{6}$$

where p_t is the (common) output deflator and $i^{\text{fix}}_{m,t}, i^{\text{flo}}_t$ are nominal rates. We suppose the real discount rate is exogenously fixed by $\beta < 1$.

6.2 Firm optimality

The firm's dynamic choices are its investment paths for tangible and intangible capital, $\{I_{I,t}, I_{T,t}\}_{t=0}^{\infty}$, which results in a sequence $\{K_{I,t+1}, K_{T,t+1}\}_{t=0}^{\infty}$. The evolution of its debt is determined by these investment choices, subject to the exogenous financing structure. Specifically, the total amount of new external financing required at time t is driven by the need to fund new tangible investment and to roll over any maturing debt from previous periods. The composition of this new financing is given by the model's parameters. A share ω is issued as fixed-rate debt, with maturities allocated according to the distribution $\Omega(m)$, and the remaining share $1-\omega$ is issued as floating-rate debt.

The firm chooses its investment sequences to maximize the expected present value of real dividends:

$$\max_{I_{j,t},K_{j,t+1}} \sum_{t=0}^{\infty} \beta^t \mathbb{E}_t d_t \tag{7}$$

subject to the capital accumulation equation (4) and the collateral constraint (5).

Because the firm can always increase current-period dividends by borrowing more against its collateral, the collateral constraint (5) will be binding at the firm's optimum. This implies that the total stock of debt is determined by the value of the firm's tangible capital stock, not chosen independently. The problem thus simplifies to a dynamic choice of investment, with the evolution of debt being a direct consequence.

Solving this optimization problem yields a set of first-order conditions (FOCs) that govern investment. The investment FOCs are standard: letting $q_{j,t}$ denote the shadow value of capital (Tobin's q), we have:

$$q_{j,t} = p_{j,t} + \Phi'_j(x_{j,t}) \quad \text{for} \quad j \in \{T, I\}, \tag{8}$$

where $x_{j,t}$ is the investment rate $I_{j,t}/K_{j,t}$. This states that the firm invests until the shadow value of capital equals its marginal cost, which is its price plus marginal adjustment costs. The capital Euler equations, which govern the evolution of $q_{j,t}$, reveal the core asymmetry of the model. Let μ_t be the Lagrange multiplier on the collateral constraint.

$$q_{j,t} = \beta \mathbb{E}_t \left\{ F_{j,t+1} - \Phi'_{j,t+1} x_{j,t+1} + \Phi_{j,t+1} + (1-\delta_j) q_{j,t+1} + \mathbf{1}_{j=T} \left(\mu_{t+1} \nu_T p_{T,t+1} \right) \right\} \tag{9}$$

The crucial term is the last one, where the shadow value of the collateral constraint, μ_{t+1}, appears only in the Euler equation for tangible capital. This is the source of the financing channel; since only tangible assets can be pledged as collateral, only their accumulation is directly affected by the tightness of financing conditions. These Euler equations form the basis of the model's dynamics. By log-linearizing them, we can derive the investment response to inflation shocks, which we turn to next.

6.3 The Mundell-Tobin Effect

Linearizing the firm's optimality conditions allows us to characterize the investment response to a shock in inflation expectations at horizon H. This response is governed by a key sufficient statistic, $W(H)$, which measures the sensitivity of the user cost of tangible capital to a change in horizon-H inflation expectations. After log-linearizing the model, we find that the investment semi-elasticities are governed by:

$$\frac{\partial x_{T,t}}{\partial \mathbb{E}_t \pi_{t+H}} = \Gamma_T \cdot W(H) \qquad \text{and} \qquad \frac{\partial x_{I,t}}{\partial \mathbb{E}_t \pi_{t+H}} = \zeta \cdot \Gamma_T \cdot W(H), \tag{10}$$

where $\Gamma_T > 0$ is a constant related to adjustment costs and $\zeta \in (0, 1)$ captures the strength of complementarity between tangible and intangible capital.

The term $W(H)$ formalizes the Mundell-Tobin effect. It quantifies the reduction in the real user cost of capital arising from a change in inflation expectations, operating through the firm's debt structure:

$$W(H) = \gamma_T \Bigg[\underbrace{\omega \sum_{m=1}^{\bar{m}} \Omega(m) \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h) w_{h|H}}_{\text{Fixed-Rate Channel}} + \underbrace{(1-\omega)\lambda \cdot \mathbf{1}_{\{H=0\}}}_{\text{Floating-Rate Channel}} \Bigg]. \tag{11}$$

Each component of this statistic has a clear economic interpretation. The overall importance of the channel is scaled by γ_T, the share of tangible investment that is externally financed. The fixed-rate channel is the core of the Mundell-Tobin effect. Its magnitude is determined by the share of fixed-rate debt, ω, and a double summation over the distribution of loan maturities, $\Omega(m)$, and the life of each loan. The term $\beta^h(1-\rho)^h a_m(h)$ represents the expected present value of principal outstanding at future period h, accounting for time discounting (β), the loan's survival probability against refinancing ($(1-\rho)^h$), and its amortization schedule ($a_m(h)$). This is all weighted by the belief spillover, $w_{h|H}$, which dictates how a shock to horizon-H expectations reshapes the entire forecast curve. In contrast, the floating-rate channel responds only to immediate inflation ($H = 0$).

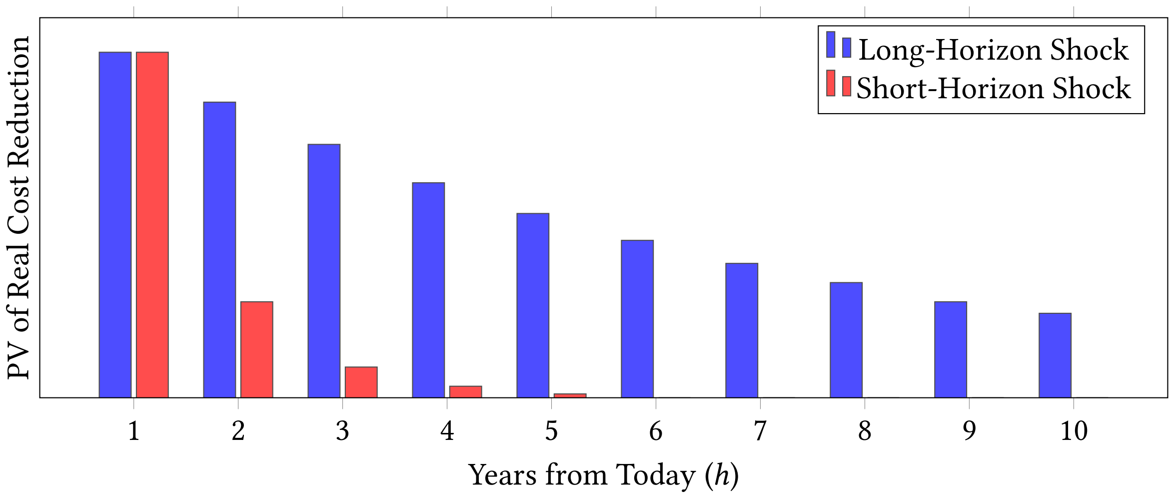
Figure 3 provides a visual intuition for this mechanism. It shows how a shock to long-term inflation expectations generates a larger and more persistent reduction in the present value of real debt service costs compared to a short-term shock. The total investment impulse is proportional to the sum of these bars; the much larger total effect for the long-horizon shock visually explains why it generates a stronger investment response.

This framework directly generates the paper's main theoretical results, providing a clear microfoundation for our empirical findings.

Proposition 1 (Tangible-Intangible Wedge)**.** *For any given inflation expectation horizon H, the semi-elasticity of tangible investment is strictly larger than that of intangible investment:*

$$0 < \frac{\partial x_{I,t}}{\partial \mathbb{E}_t \pi_{t+H}} < \frac{\partial x_{T,t}}{\partial \mathbb{E}_t \pi_{t+H}}.$$

Figure 3: The Debt Service Ladder: Why Long-Horizon Shocks Matter More



Notes: The figure provides a visual intuition for the horizon profile effect. It plots the discounted real cost reduction, $\beta^h(1-\rho)^h a_m(h)w_{h|H}$, for each year of a hypothetical 10-year loan. A shock to long-term expectations (blue bars) is persistent, leading to cost reductions over the entire life of the loan. A shock to short-term expectations (red bars) is transitory, with benefits that decay rapidly. The total investment impulse is proportional to the sum of these bars (the total area). The much larger area for the long-horizon shock visually explains why it generates a stronger investment response, as formalized in Proposition 2.

This result rationalizes the significant wedge we observe in the data. Higher expected inflation directly lowers the user cost of debt-financed tangible assets, stimulating tangible investment. Intangible investment, which is not debt-financed, rises only indirectly through its production complementarity with tangible capital ($F_{TI} > 0$), making its response positive but strictly smaller. This asymmetry is a key prediction of the financing channel and would be difficult to explain with a uniform mechanism like sticky discount rates.

Proposition 2 (Rising Horizon Profile)**.** *The sensitivity of investment to inflation expectations rises with the horizon H, because* $\frac{\partial W(H)}{\partial H} > 0$.

A shock to long-term inflation expectations (a "level" shock) reduces the real value of debt payments over a longer period compared to a short-term shock (a "slope" shock). For firms with a meaningful share of long-maturity, fixed-rate debt, this creates a larger reduction in the present value of their liabilities, leading to a stronger immediate investment response, consistent with our empirical estimates.[7]

7. Our model identifies $W(H)$ as the key sufficient statistic. Ideally, we would compute firm-level $W(H)$ using detailed debt maturity data and test whether it predicts investment responses. Italian balance sheets provide only coarse proxies for loan maturity structure, limiting our ability to construct $W(H)$ precisely. Instead, we test the model's predictions by examining heterogeneity along its key components: leverage, long-term debt share, and liquidity. These reduced-form tests are consistent with the $W(H)$ mechanism, but future work with richer debt data could provide sharper validation.

While Propositions 1 and 2 establish the core time-series and cross-asset dynamics of the financing channel, the model also makes sharp predictions about how its magnitude varies across firms based on their balance sheets.

Proposition 3 (Leverage Non-Monotonicity)**.** *If the credit spread $\sigma(L_t)$ is increasing and convex in leverage, the investment response to an inflation shock is hump-shaped with respect to leverage.*

This result captures a crucial economic trade-off. At low leverage, the credit spread is negligible. In this regime, increasing leverage magnifies the benefits of the Mundell-Tobin channel; a larger stock of nominal liabilities means a greater gain from having its real value eroded by expected inflation. The investment response is therefore initially increasing in leverage. At high leverage, however, the costs of financial distress begin to dominate. The convexity of the credit spread function means that each additional unit of debt becomes progressively more expensive. This rising marginal cost of debt counteracts the benefits of the inflation-erosion channel, causing the investment impulse to weaken. This theoretical non-monotonicity aligns precisely with our empirical finding that the financing channel is strongest for firms in the middle of the leverage distribution.

7 Conclusion

This paper provides the first causal estimates of how the term structure of inflation expectations affects investment. Using a randomized information experiment linked to firm-level balance sheets in Italy, we document that the investment semi-elasticity with respect to expected inflation nearly doubles as the forecast horizon extends from six months to several years, and that this response is concentrated in tangible assets—roughly four times the intangible response. These findings, together with heterogeneity that is non-monotonic in leverage and increasing in long-term debt share, point uniquely to a Mundell-Tobin financing channel operating through the firm's nominal debt structure.

We formalize this channel in a dynamic model that yields a sufficient statistic, $W(H)$, aggregating the firm's debt maturity distribution, amortization, refinancing hazard, and fixed-rate share into a single measure of exposure to horizon-H belief shifts. Because $W(H)$ is determined by observable features of the credit market, the framework is portable: it applies to any economy with fixed-rate lending, and its quantitative importance scales with the prevalence of such debt.

Several extensions would deepen our understanding of how the channel operates. Examining whether the horizon profile and tangible-intangible wedge hold in countries with different debt market structures would clarify external validity. The framework also generates cross-country predictions: the effectiveness of monetary policy at stimulating investment through the expectations channel should vary with the structure of lending, implying that the same forward guidance has different real effects in economies with different fixed-rate shares and debt maturities. Our mechanism operates in partial equilibrium; the degree of general equilibrium attenuation—particularly through endogenous interest rate responses—remains an open question. Finally, constructing firm-level measures of $W(H)$ from detailed debt microdata would allow direct tests of the sufficient statistic and sharpen the connection between theory and evidence.

References

Almeida, Heitor, Murillo Campello, Bruno Laranjeira, and Scott Weisbenner. 2012. "Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis." *Critical Finance Review* 1 (1): 3–58. ISSN: 21611815. https://doi.org/10.1561/103.00000001.

Andrade, Philippe, Olivier Coibion, Erwan Gautier, and Yuriy Gorodnichenko. 2022. "No firm is an island? How industry conditions shape firms' expectations." *Journal of Monetary Economics* 125 (C): 40–56. https://doi.org/10.1016/j.jmoneco.2021.05.006.

Bottone, Marco, Alex Tagliabracci, and Giordano Zevi. 2022. "Inflation expectations and the ECB's perceived inflation objective: Novel evidence from firm-level data." *Journal of Monetary Economics* 129:S15–S34.

Candia, Bernardo, Olivier Coibion, and Yuriy Gorodnichenko. 2022. *The Macroeconomic Expectations of Firms.* NBER Working Papers 30042. National Bureau of Economic Research, Inc, May. https://ideas.repec.org/p/nbr/nberwo/30042.html.

Cloyne, James, Clodomiro Ferreira, Maren Froemel, and Paolo Surico. 2023. "Monetary Policy, Corporate Finance, and Investment." *Journal of the European Economic Association* 21, no. 6 (December): 2586–2634. ISSN: 1542-4766. https://doi.org/10.1093/jeea/jvad009.

Coibion, Olivier, Yuriy Gorodnichenko, and Saten Kumar. 2018. "How do firms form their expectations? New survey evidence." *American Economic Review* 108 (9): 2671–2713.

Coibion, Olivier, Yuriy Gorodnichenko, and Tiziano Ropele. 2020. "Inflation expectations and firm decisions: New causal evidence." *The Quarterly Journal of Economics* 135 (1): 165–219.

Core, Fabrizio, Filippo De Marco, Tim Eisert, and Glenn Schepens. 2025. *Inflation and floating-rate loans: evidence from the euro-area.* Working Paper Series 3064. European Central Bank, June. https://doi.org/None. https://ideas.repec.org/p/ecb/ecbwps/20253064.html.

Corrado, Carol, Charles Hulten, and Daniel Sichel. 2009. "Intangible capital and US economic growth." *Review of income and wealth* 55 (3): 661–685.

Crouzet, Nicolas, and Janice Eberly. 2021. "Intangibles, markups, and the measurement of productivity growth." *Journal of Monetary Economics* 124:S92–S109.

Crouzet, Nicolas, Janice C Eberly, Andrea L Eisfeldt, and Dimitris Papanikolaou. 2022. "The economics of intangible capital." *Journal of Economic Perspectives* 36 (3): 29–52.

Doepke, Matthias, and Martin Schneider. 2006. "Inflation and the Redistribution of Nominal Wealth." *Journal of Political Economy* 114, no. 6 (December): 1069–1097. ISSN: 0022-3808. https://doi.org/10.1086/508379.

Falato, Antonio, Dalida Kadyrzhanova, Jae Sim, and Robert Steri. 2022. "Rising Intangible Capital, Shrinking Debt Capacity, and the U.S. Corporate Savings Glut." *The Journal of Finance* 77, no. 5 (October): 2799–2852. ISSN: 0022-1082. https://doi.org/10.1111/jofi.13174.

Fukui, Masao, Niels Joachim Gormsen, and Kilian Huber. 2024. *Sticky Discount Rates.* Working Paper, Working Paper Series 32238. National Bureau of Economic Research, March. https://doi.org/10.3386/w32238. http://www.nber.org/papers/w32238.

Gomes, João, Urban Jermann, and Lukas Schmid. 2016. "Sticky Leverage." *American Economic Review* 106, no. 12 (December): 3800–3828. ISSN: 0002-8282. https://doi.org/10.1257/aer.20130952.

Grasso, Adriana, and Tiziano Ropele. 2018. "Firms' inflation expectations and investment plans." *Bank of Italy Temi di Discussione (Working Paper) No* 1203.

Guo, Zixing. 2025. "The Macro Impact of the Debt-Inflation Channel on Investment." Mimeo, November.

Gurkaynak, Refet, Hatice Gokce Karasoy-Can, and Sang Seok Lee. 2022. "Stock Market's Assessment of Monetary Policy Transmission: The Cash Flow Effect." *The Journal of Finance* 77, no. 4 (August): 2375–2421. ISSN: 0022-1082. https://doi.org/10.1111/jofi.13163.

Haskel, Jonathan, and Stian Westlake. 2018. *Capitalism without Capital: The Rise of the Intangible Economy.* Princeton University Press. ISBN: 9780691175034.

Hennessy, Christopher A., and Toni M. Whited. 2007. "How Costly Is External Financing? Evidence from a Structural Estimation." *The Journal of Finance* 62, no. 4 (August): 1705–1745. ISSN: 0022-1082. https://doi.org/10.1111/j.1540-6261.2007.01255.x.

Ippolito, Filippo, Ali K. Ozdagli, and Ander Perez-Orive. 2018. "The transmission of monetary policy through bank lending: The floating rate channel." *Journal of Monetary Economics* 95 (May): 49–71. ISSN: 03043932. https://doi.org/10.1016/j.jmoneco.2018.02.001.

Jeenas, Priit. 2023. *Firm balance sheet liquidity, monetary policy shocks, and investment dynamics.* Economics Working Papers 1872. Department of Economics and Business, Universitat Pompeu Fabra, October. https://doi.org/None. https://ideas.repec.org/p/upf/upfgen/1872.html.

Jungherr, Joachim, Matthias Meier, Timo Reinelt, and Immo Schott. 2024. "Corporate Debt Maturity Matters for Monetary Policy." *Federal Reserve Bank of San Francisco, Working Paper Series* 2024, no. 30 (August): 01–89. https://doi.org/10.24148/wp2024-30.

Kumar, Saten, Yuriy Gorodnichenko, and Olivier Coibion. 2023. "The effect of macroeconomic uncertainty on firm decisions." *Econometrica* 91 (4): 1297–1332.

McGrattan, Ellen R. 2020. "Intangible capital and measured productivity." *Review of Economic Dynamics* 37:S147–S166.

Michelangeli, Valentina, and Fabio Massimo Piersanti. 2025. *Business loan characteristics and inflation shocks transmission in the euro area.* Temi di discussione (Economic working papers) 1477. Bank of Italy, Economic Research and International Relations Area, February. https://doi.org/None. https://ideas.repec.org/p/bdi/wptemi/td_1477_25.html.

Modigliani, Franco, and Richard A Cohn. 1979. "Inflation, rational valuation and the market." *Financial Analysts Journal* 35 (2): 24–44.

Mundell, Robert. 1963. "Inflation and Real Interest." *Journal of Political Economy* 71, no. 3 (June): 280–283. ISSN: 0022-3808. https://doi.org/10.1086/258771.

Ottonello, Pablo, and Thomas Winberry. 2018. "Financial Heterogeneity and the Investment Channel of Monetary Policy." https://doi.org/10.3386/w24221.

Peters, Ryan H., and Lucian A. Taylor. 2017. "Intangible capital and the investment-q relation." *Journal of Financial Economics* 123 (2): 251–272. ISSN: 0304405X. https://doi.org/10.1016/j.jfineco.2016.03.011.

Qi, Zhenghua, and Tiziano Ropele. 2026. "Bank Credit and Firms' Attention to Inflation." Mimeo.

Rampini, Adriano A., and S. Viswanathan. 2013. "Collateral and capital structure." *Journal of Financial Economics* 109, no. 2 (August): 466–492. ISSN: 0304405X. https://doi.org/10.1016/j.jfineco.2013.03.002.

Rauh, Joshua D. 2006. "Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans." *The Journal of Finance* 61, no. 1 (February): 33–71. ISSN: 0022-1082. https://doi.org/10.1111/j.1540-6261.2006.00829.x.

Riggi, Marianna, and Alex Tagliabracci. 2022. *Price rigidities, input costs, and inflation expectations: understanding firms' pricing decisions from micro data.* Questioni di Economia e Finanza (Occasional Papers) 733. https://ideas.repec.org/p/bdi/opques/qef_733_22.html.

Ropele, Tiziano, Yuriy Gorodnichenko, and Olivier Coibion. 2024. "Inflation Expectations and Misallocation of Resources: Evidence from Italy." *American Economic Review: Insights* 6, no. 2 (June): 246–61. https://doi.org/10.1257/aeri.20230201. https://www.aeaweb.org/articles?id=10.1257/aeri.20230201.

Rosolia, Alfonso. 2024. "Do Firms Act on Their Inflation Expectations? Another Look at Italian Firms." *Journal of Political Economy Macroeconomics* 2 (4): 651–686.

Tobin, James. 1965. "Money and Economic Growth." *Econometrica* 33, no. 4 (October): 671. ISSN: 00129682. https://doi.org/10.2307/1910352.

Vilerts, Karlis, Sofia Anyfantaki, Konstantins Benkovskis, Vanessa Kunzmann, Tibor Lalinsky, Filippos Petroulakis, Klavs Zutis, Sebastian Bredl, Massimo Giovannini, and Florian Mat Horky. 2025. *Details matter: loan pricing and transmission of monetary policy in the euro area.* Working Paper Series 3078. European Central Bank, July. https://doi.org/None. https://ideas.repec.org/p/ecb/ecbwps/20253078.html.

Weber, Michael, Francesco D'Acunto, Yuriy Gorodnichenko, and Olivier Coibion. 2022. "The Subjective Inflation Expectations of Households and Firms: Measurement, Determinants, and Implications." *Journal of Economic Perspectives* 36 (3): 157–84. https://doi.org/10.1257/jep.36.3.157. https://www.aeaweb.org/articles?id=10.1257/jep.36.3.157.

A Data

Table A.1: Summary statistics

	No.	mean	p25	p50	p75
Panel A: whole sample					
Assets, EUR	13268	284397.65	13129.50	34133.50	102365.00
Investment/Assets (%)	13268	3.58	0.59	1.97	4.74
Intangible Investment/Assets (%)	13268	0.63	0.00	0.09	0.50
Tangible Investment/Assets (%)	13268	2.85	0.37	1.41	3.68
levam	13268	68.26	50.94	68.21	82.10
Liquid Assets/Assets (%)	13268	10.28	1.00	6.00	15.00
Debt/Assets (%)	13268	23.11	6.78	21.42	35.83
Long-term Debt/Assets (%)	12069	0.24	0.01	0.07	0.25
$\mathbb{E}\pi_{6m}$	13268	2.04	0.45	1.00	2.08
$\mathbb{E}\pi_{1y}$	13268	1.97	0.55	1.10	2.17
$\mathbb{E}\pi_{2y}$	13268	1.91	0.72	1.30	2.20
$\mathbb{E}\pi_{3-5y}$	13120	1.92	0.85	1.50	2.25
Macroeconomic outlook	13213	1.92	2.00	2.00	2.00
Business sentiment	13243	3.00	3.00	3.00	3.00
Credit access	13217	1.99	2.00	2.00	2.00
Liquidity	13234	2.11	2.00	2.00	2.00
Panel B: control group					
	No.	mean	p25	p50	p75
Assets, EUR	3680	300061.02	13254.50	36189.00	100712.50
Investment/Assets (%)	3680	3.44	0.55	1.97	4.60
Intangible Investment/Assets (%)	3680	0.58	0.00	0.08	0.44
Tangible Investment/Assets (%)	3680	2.77	0.34	1.42	3.65
levam	3680	68.14	51.51	68.71	82.88
Liquid Assets/Assets (%)	3680	9.76	1.00	5.00	14.00
Debt/Assets (%)	3680	23.61	7.12	22.33	36.50
Long-term Debt/Assets (%)	3391	0.21	0.00	0.06	0.24
$\mathbb{E}\pi_{6m}$	3680	1.78	0.50	1.00	2.00
$\mathbb{E}\pi_{1y}$	3680	1.76	0.60	1.15	2.00
$\mathbb{E}\pi_{2y}$	3680	1.76	0.80	1.40	2.15
$\mathbb{E}\pi_{3-5y}$	3633	1.79	0.97	1.50	2.20
Macroeconomic outlook	3664	1.91	2.00	2.00	2.00
Business sentiment	3673	3.00	3.00	3.00	3.00
Credit access	3666	1.98	2.00	2.00	2.00
Liquidity	3667	2.09	2.00	2.00	2.00

Notes: The table contains summary statistics of yearly variables for the whole sample (panel A) and control group (panel B). The sample is restricted to firms covered in the merged database (SIGE+CADS) between 2014Q1 and 2023Q4.

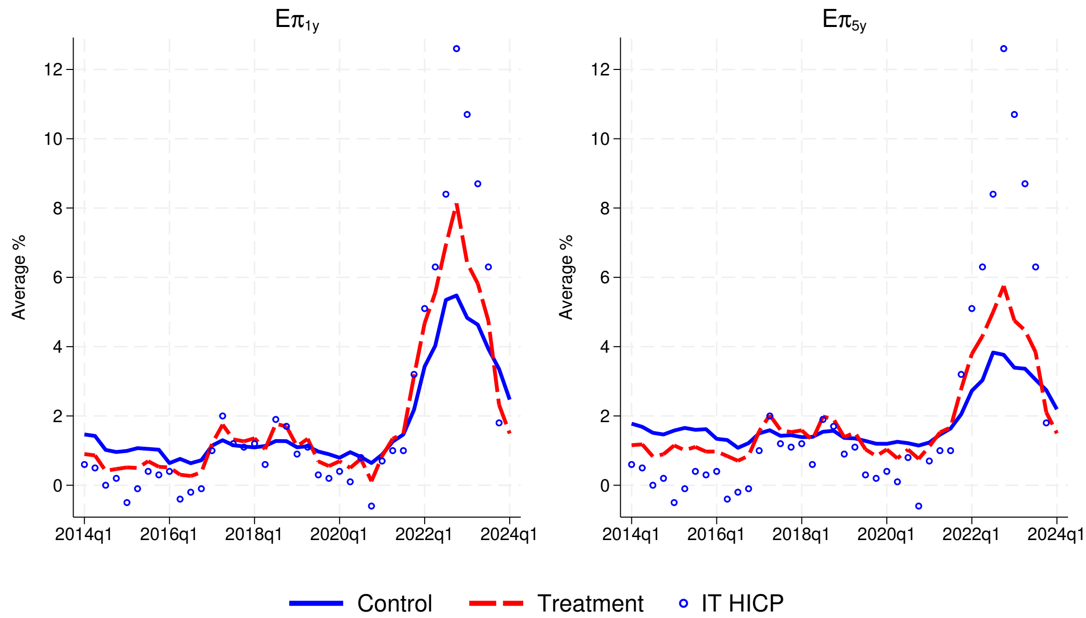
Table A.2: Summary statistics (continued)

Panel C: treated group with negative expectations revision					
	No.	mean	p25	p50	p75
Assets, EUR	5187	190495.80	11430.00	29497.00	86853.00
Investment/Assets (%)	5187	3.63	0.58	1.95	4.76
Intangible Investment/Assets (%)	5187	0.66	0.00	0.09	0.52
Tangible Investment/Assets (%)	5187	2.85	0.36	1.37	3.72
levam	5187	69.71	51.08	68.01	82.30
Liquid Assets/Assets (%)	5187	11.17	2.00	6.00	16.00
Debt/Assets (%)	5187	22.46	6.05	20.09	35.08
Long-term Debt/Assets (%)	4652	0.29	0.01	0.09	0.31
$\mathbb{E}\pi_{6m}$	5187	2.19	0.40	1.00	3.70
$\mathbb{E}\pi_{1y}$	5187	2.07	0.50	1.00	3.25
$\mathbb{E}\pi_{2y}$	5187	1.96	0.60	1.20	2.70
$\mathbb{E}\pi_{3-5y}$	5116	1.95	0.70	1.40	2.50
Macroeconomic outlook	5154	1.91	2.00	2.00	2.00
Business sentiment	5176	3.01	3.00	3.00	3.00
Credit access	5155	1.99	2.00	2.00	2.00
Liquidity	5171	2.12	2.00	2.00	2.00

Panel D: treated group with positive expectations revision					
	count	mean	p25	p50	p75
Assets, EUR	4399	382122.83	15019.00	38946.00	122997.00
Investment/Assets (%)	4399	3.65	0.64	1.99	4.81
Intangible Investment/Assets (%)	4399	0.65	0.00	0.10	0.53
Tangible Investment/Assets (%)	4399	2.90	0.41	1.44	3.67
levam	4399	66.65	50.32	68.10	81.12
Liquid Assets/Assets (%)	4399	9.66	1.00	5.00	14.00
Debt/Assets (%)	4399	23.46	7.34	22.21	36.12
Long-term Debt/Assets (%)	4024	0.20	0.01	0.06	0.20
$\mathbb{E}\pi_{6m}$	4399	2.07	0.47	1.00	1.50
$\mathbb{E}\pi_{1y}$	4399	2.03	0.60	1.10	1.70
$\mathbb{E}\pi_{2y}$	4399	1.98	0.80	1.32	1.93
$\mathbb{E}\pi_{3-5y}$	4369	1.98	0.92	1.50	2.07
Macroeconomic outlook	4393	1.92	2.00	2.00	2.00
Business sentiment	4392	3.00	3.00	3.00	3.00
Credit access	4394	1.99	2.00	2.00	2.00
Liquidity	4394	2.10	2.00	2.00	2.00

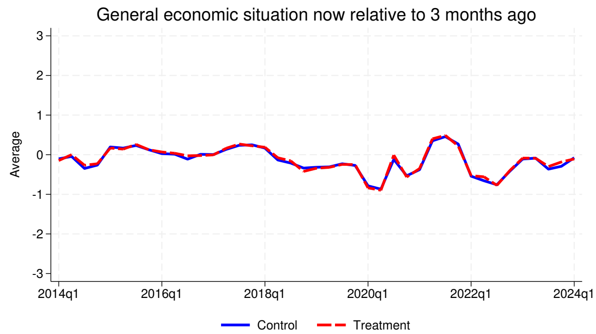
Notes: The table contains summary statistics of yearly variables for the treatment group with negative (panel C) and positive (panel D) expectations' revisions. The sample is restricted to firms covered in the merged database (SIGE+CADS) between 2014Q1 and 2023Q4.

Figure A.1: Average Inflation Expectations by Treatment Group

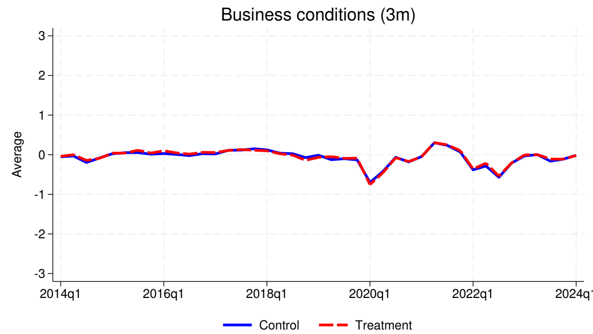


Notes: The figure plots quarterly average inflation expectations at 1 year (LHS) and 5 years (RHS) for the control and treatment group. The blue dots represent Harmonized Index of Consumer Prices for Italy (IT HICP). The sample is restricted to firms covered in SIGE between 2014Q1 and 2023Q4.

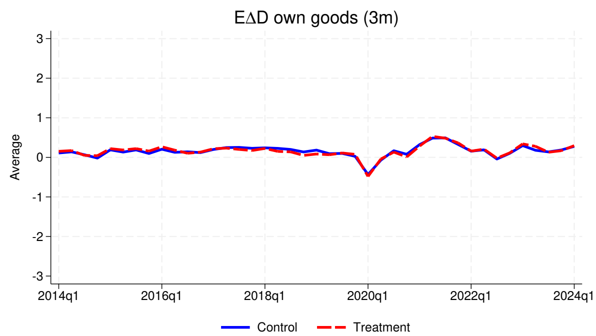
Figure A.2: Inflation Expectations and other firm-level beliefs



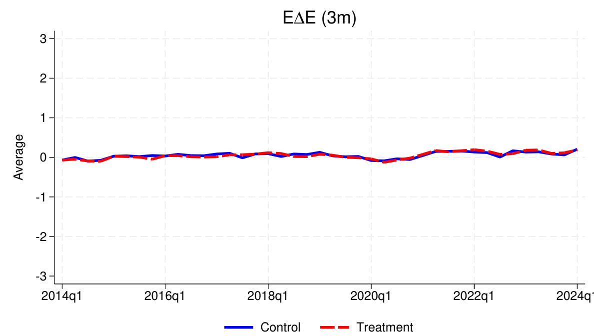
(a) General economic situation (past 3 months)



(b) Business sentiment (next 3 months)



(c) Demand for own goods (next 3 months)



(d) Number of employees (next 3 months)

Notes: The figure shows quarterly average expectations (qualitative answers) for control and treatment group. In the top row, the LHS plot represents expectations on general economic situation over the past three months, the RHS business sentiment over the next three months. In the bottom row, the LHS shows expected change in demand for own goods, the RHS expected change in numbers of employees, over the next three months. The sample is restricted to firms covered in SIGE between 2014Q1 and 2023Q4.

B Additional Regression Tables

Table B.1: Investment plans, OLS and IV

	$\mathbb{P}(\Delta Inv_{t+1} > 0)$							
	OLS				IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbb{E}\pi_{6m}$	0.003				0.029***			
	(0.003)				(0.003)			
$\mathbb{E}\pi_{1y}$		0.004				0.034***		
		(0.003)				(0.004)		
$\mathbb{E}\pi_{2y}$			0.010***				0.043***	
			(0.003)				(0.004)	
$\mathbb{E}\pi_{3-5y}$				0.011***				0.052***
				(0.003)				(0.006)
Observations	40989	40989	40989	40989	40986	40986	40986	40986
Adj R-squared	0.089	0.089	0.089	0.089	0.078	0.077	0.077	0.075
Firm, Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Credit Access and Liquidity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains estimates obtained by regressing probability of increasing investment on inflation expectations at 5 years (column 1-3) and at 1 year (column 4). Panel A reports the estimates of the OLS regression, while panel B of the IV . Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. Standard errors, in parentheses, are clustered at firm×quarter level.

Table B.2: IV Second Stage, Investments

	$\text{Inv}_{t+1}/Asset_t$ (IV)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.227^{***}				
	(0.031)				
$\mathbb{E}\pi_{1y}$		0.268^{***}			
		(0.037)			
$\mathbb{E}\pi_{2y}$			0.344^{***}		
			(0.048)		
$\mathbb{E}\pi_{3-5y}$				0.426^{***}	
				(0.061)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					0.330
					(0.377)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.095
					(0.099)
$\mathbf{1}(t \geq 2021)$					0.920
					(0.569)
Observations	9223	9223	9223	9223	9223
Adj R-squared	0.012	0.011	0.009	0.006	0.017
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression: , using the following specification: $Inv_{i,t+1} = \alpha_i + \theta_t + \psi \mathbb{E}_{it}\pi_{t+H} + \boldsymbol{\beta}' X_{it} + \eta_{it}$. Overall investments are regressed on instrumented inflation expectations. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table B.3: IV Second Stage, Tangible Investments

	Tangible $\text{Inv}_{t+1}/Asset_t$ (IV)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.173^{***}				
	(0.027)				
$\mathbb{E}\pi_{1y}$		0.204^{***}			
		(0.032)			
$\mathbb{E}\pi_{2y}$			0.264^{***}		
			(0.042)		
$\mathbb{E}\pi_{3-5y}$				0.329^{***}	
				(0.052)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					0.621^{*}
					(0.320)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.087
					(0.087)
$\mathbf{1}(t \geq 2021)$					1.112^{**}
					(0.484)
Observations	9223	9223	9223	9223	9223
Adj R-squared	0.014	0.014	0.013	0.010	0.016
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression: , using the following specification: $Inv_{i,t+1} = \alpha_i + \theta_t + \psi \mathbb{E}_{it}\pi_{t+H} + \boldsymbol{\beta}' X_{it} + \eta_{it}$. Tangible investments are regressed on instrumented inflation expectations. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table B.4: IV Second Stage, Intangible Investments

	Intangible $\text{Inv}_{t+1}/Asset_t$ (IV)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.045***				
	(0.010)				
$\mathbb{E}\pi_{1y}$		0.053***			
		(0.012)			
$\mathbb{E}\pi_{2y}$			0.067***		
			(0.015)		
$\mathbb{E}\pi_{3-5y}$				0.082***	
				(0.019)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					-0.204*
					(0.119)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.026
					(0.031)
$\mathbf{1}(t \geq 2021)$					-0.174
					(0.181)
Observations	9223	9223	9223	9223	9223
Adj R-squared	0.001	0.001	0.001	0.001	0.001
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression: , using the following specification: $Inv_{i,t+1} = \alpha_i + \theta_t + \psi \mathbb{E}_{it}\pi_{t+H} + \boldsymbol{\beta}' X_{it} + \eta_{it}$. Intangible investments are regressed on instrumented inflation expectations. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level

Table B.5: First Stage Regressions using CGR Treatment

	$\mathbb{E}\pi_{6m}$	$\mathbb{E}\pi_{1y}$	$\mathbb{E}\pi_{2y}$	$\mathbb{E}\pi_{3-5y}$
	(1)	(2)	(3)	(4)
T_{it}	0.428***	0.364***	0.289***	0.239***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	9223	9223	9223	9223
F	1064.645	662.055	355.346	218.990
Firm, Time FE	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the first stage of IV-2SLS regression using the same instrument Coibion, Gorodnichenko, and Ropele 2020. We first create a dummy variable equal to 1 if firms are treated and 0 otherwise, and we then multiply that dummy by the level of inflation associated with that treatment. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table B.6: IV with CGR Treatment, Second Stage, Investments

	$\text{Inv}_{t+1}/Asset_t$ (IV)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.176***				
	(0.027)				
$\mathbb{E}\pi_{1y}$		0.208***			
		(0.032)			
$\mathbb{E}\pi_{2y}$			0.266***		
			(0.041)		
$\mathbb{E}\pi_{3-5y}$				0.326***	
				(0.051)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					0.091
					(0.224)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.246***
					(0.071)
Observations	9223	9223	9223	9223	9223
Adj R-squared	0.014	0.013	0.012	0.011	0.013
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression. In this robustness test, we employ the same instrument as in Coibion, Gorodnichenko, and Ropele 2020, i.e. we first create a dummy variable equal to 1 if firms are treated and 0 otherwise, and we then multiply that dummy by the level of inflation associated with that treatment. Overall investments are regressed on instrumented inflation expectations. Controls include macroeconomic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table B.7: IV with CGR Treatment, Second Stage, Tangible Investments

	Tangible $\text{Inv}_{t+1}/Asset_t$ (IV)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.139^{***}				
	(0.023)				
$\mathbb{E}\pi_{1y}$		0.165^{***}			
		(0.028)			
$\mathbb{E}\pi_{2y}$			0.211^{***}		
			(0.036)		
$\mathbb{E}\pi_{3-5y}$				0.260^{***}	
				(0.044)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					0.162
					(0.192)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.219^{***}
					(0.061)
Observations	9223	9223	9223	9223	9223
Adj R-squared	0.015	0.015	0.015	0.013	0.015
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression. In this robustness test, we employ the same instrument as in Coibion, Gorodnichenko, and Ropele 2020, i.e. we first create a dummy variable equal to 1 if firms are treated and 0 otherwise, and we then multiply that dummy by the level of inflation associated with that treatment. Tangible investments are regressed on instrumented inflation expectations. Controls include macroeconomic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table B.8: IV with CGR Treatment, Second Stage, Intangible Investments

	Intangible $\text{Inv}_{t+1}/Asset_t$ (IV)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.031***				
	(0.008)				
$\mathbb{E}\pi_{1y}$		0.037***			
		(0.010)			
$\mathbb{E}\pi_{2y}$			0.047***		
			(0.013)		
$\mathbb{E}\pi_{3-5y}$				0.057***	
				(0.016)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					-0.034
					(0.065)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.030
					(0.022)
Observations	9223	9223	9223	9223	9223
Adj R-squared	0.001	0.000	-0.000	-0.001	0.001
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression. In this robustness test, we employ the same instrument as in Coibion, Gorodnichenko, and Ropele 2020, i.e. we first create a dummy variable equal to 1 if firms are treated and 0 otherwise, and we then multiply that dummy by the level of inflation associated with that treatment. Intangible investments are regressed on instrumented inflation expectations. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level

Table B.9: Investments, Long-term Inflation Expectations, and Liquidity

	$\text{Investment}_{t+1}/\text{Assets}_t$	$\text{Intangibles}_{t+1}/\text{Assets}_t$	$\text{Tangibles}_{t+1}/\text{Assets}_t$
	(1)	(2)	(3)
$\mathbb{E}\pi_{3-5y}\times$ Q2 of Liquidity_t	0.069	0.038	0.018
	(0.079)	(0.023)	(0.066)
$\mathbb{E}\pi_{3-5y}\times$ Q3 of Liquidity_t	0.090	0.057^{**}	0.036
	(0.077)	(0.024)	(0.066)
$\mathbb{E}\pi_{3-5y}\times$ Q4 of Liquidity_t	0.008	0.002	0.001
	(0.081)	(0.023)	(0.069)
$\mathbb{E}\pi_{3-5y}$	0.129^{**}	-0.005	0.130^{***}
	(0.058)	(0.017)	(0.050)
Constant	2.360^{***}	0.507^{***}	1.677^{***}
	(0.262)	(0.082)	(0.220)
Observations	9235	9235	9235
Adj R-squared	0.014	0.001	0.015
Firm, Time FE	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results for IV-2SLS regression of (1) overall, (2) intangible, and (3) tangible investment on instrumented long-term expectations interacted with quartiles of liquidity. Buckets of liquidity are computed per each year, and they refer to the year ahead of the investment decisions. Controls include macro-economic outlook, business sentiment, firm's perception of credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014-2023. Standard errors, in parentheses, are clustered at firm×quarter level

Table B.10: Investments, Long-term Inflation Expectations, and Leverage

	$\text{Investment}_{t+1}/\text{Assets}_t$	$\text{Intangibles}_{t+1}/\text{Assets}_t$	$\text{Tangibles}_{t+1}/\text{Assets}_t$
	(1)	(2)	(3)
$\mathbb{E}\pi_{3-5y} \times$ Q2 of Leverage_t	0.219^{***}	0.096^{***}	0.100
	(0.078)	(0.022)	(0.068)
$\mathbb{E}\pi_{3-5y} \times$ Q3 of Leverage_t	0.031	0.130^{***}	-0.121^{*}
	(0.078)	(0.023)	(0.067)
$\mathbb{E}\pi_{3-5y} \times$ Q4 of Leverage_t	-0.320^{***}	0.099^{***}	-0.436^{***}
	(0.083)	(0.025)	(0.070)
$\mathbb{E}\pi_{3-5y}$	0.188^{***}	-0.064^{***}	0.262^{***}
	(0.059)	(0.017)	(0.051)
Constant	2.503^{***}	0.476^{***}	1.854^{***}
	(0.261)	(0.082)	(0.220)
Observations	9235	9235	9235
Adj R-squared	0.012	0.002	0.013
Firm, Time FE	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results for IV-2SLS regression of (1) overall, (2) intangible, and (3) tangible investment on instrumented long-term expectations interacted with quartiles of leverage. Buckets of leverage are computed per each year, and they refer to the year ahead of the investment decisions. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014-2023. Standard errors, in parentheses, are clustered at firm×quarter level.

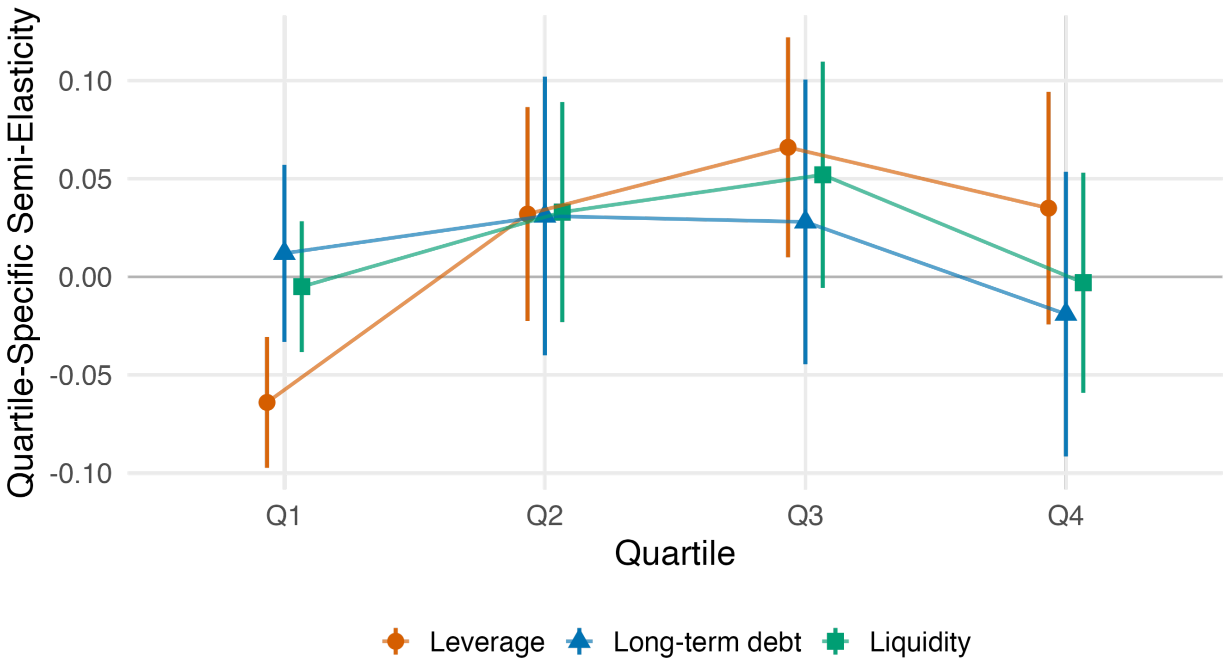
Table B.11: Investments, Long-term Inflation Expectations, and Long-term Debt

	$\text{Investment}_{t+1}/\text{Assets}_t$	$\text{Intangibles}_{t+1}/\text{Assets}_t$	$\text{Tangibles}_{t+1}/\text{Assets}_t$
	(1)	(2)	(3)
$\mathbb{E}\pi_{3-5y} \times$ Q2 of Lt Debt_t	0.053	0.019	0.048
	(0.091)	(0.028)	(0.078)
$\mathbb{E}\pi_{3-5y} \times$ Q3 of Lt Debt_t	0.292^{***}	0.016	0.267^{***}
	(0.097)	(0.029)	(0.083)
$\mathbb{E}\pi_{3-5y} \times$ Q4 of Lt Debt_t	0.221^{**}	-0.031	0.229^{***}
	(0.102)	(0.029)	(0.088)
$\mathbb{E}\pi_{3-5y}$	0.015	0.012	0.002
	(0.079)	(0.023)	(0.069)
Constant	2.613^{***}	0.606^{***}	1.784^{***}
	(0.344)	(0.096)	(0.293)
Observations	6073	6073	6073
Adj R-squared	0.012	0.003	0.014
Firm, Time FE	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

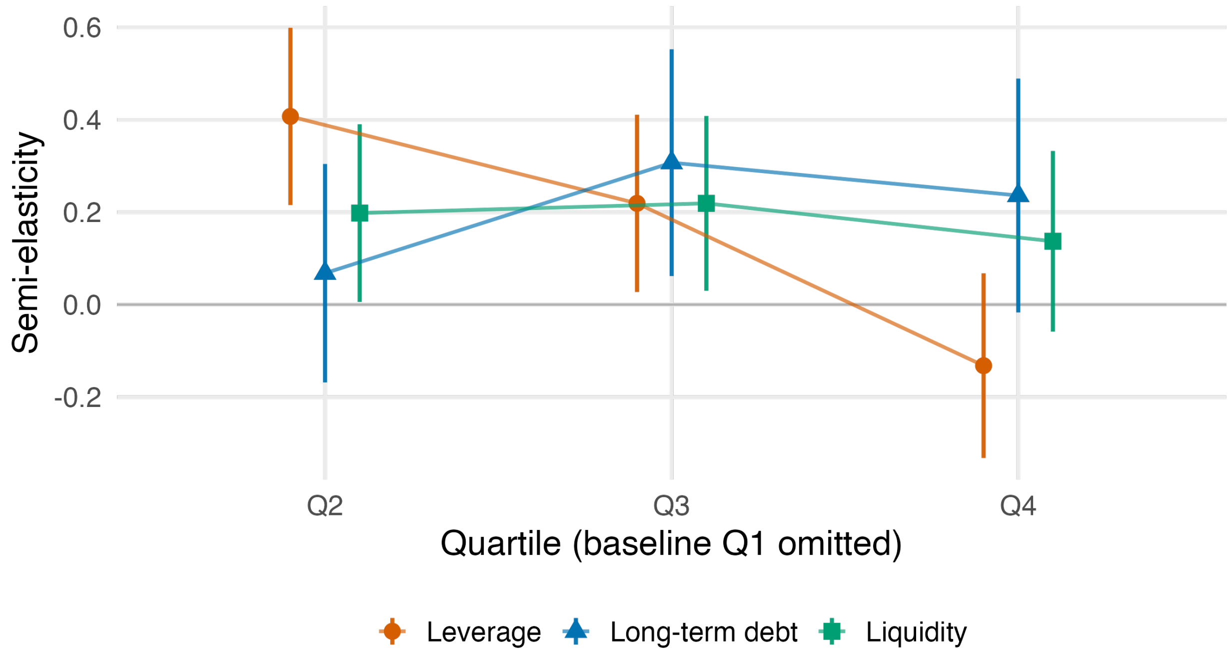
Notes: The table contains results for IV-2SLS regression of (1) overall, (2) tangible, and (3) intangible investment on instrumented long-term expectations interacted with quartiles of long-term debt. Buckets of long-term debt are computed per each year, and they refer to the year ahead of the investment decisions. Controls include macroeconomic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014-2023. Standard errors, in parentheses, are clustered at firm×quarter level.

Figure B.1: Marginal Effects by Financial Condition (Intangible Investment)



Notes: Notes. Each point is a quartile-specific semi-elasticity of tangible investment with respect to long-horizon inflation expectations (pp of assets per 1 pp increase in $\mathbb{E}\pi_{3-5y}$). For quartile Q_k ($k = 2, 3, 4$), the effect equals the baseline slope for $Q1$ plus the Qk interaction from the IV regression. Quartile $Q1$ is omitted from the plot for readability. All specifications include firm and time fixed effects and controls for macroeconomic outlook and credit access; standard errors are clustered at the firm×quarter level. Full results are in Tables B.10, B.11, and B.9.

Figure B.2: Marginal Effects by Financial Condition (Total Investment)



Notes: Notes. Each point is a quartile-specific semi-elasticity of tangible investment with respect to long-horizon inflation expectations (pp of assets per 1 pp increase in $\mathbb{E}\pi_{3-5y}$). For quartile Q_k ($k = 2, 3, 4$), the effect equals the baseline slope for $Q1$ plus the Qk interaction from the IV regression. Quartile $Q1$ is omitted from the plot for readability. All specifications include firm and time fixed effects and controls for macroeconomic outlook and credit access; standard errors are clustered at the firm×quarter level. Full results are in Tables B.10, B.11, and B.9.

C Model Derivations and Proofs

This appendix provides formal derivations for the sufficient statistic $W(H)$ introduced in Section 6 and proves Propositions 1–3. We maintain the notation and assumptions from the main text.

C.1 Derivation of the Sufficient Statistic $W(H)$

We derive the investment semi-elasticity with respect to horizon-H inflation expectations by log-linearizing the firm's optimality conditions around a steady state with $\bar{\pi} = 0$.

Step 1: Fixed-rate debt service. For a unit of tangible investment financed at time t with a fixed-rate loan of maturity m, the nominal debt-service payment at time t+h is $(i^{\text{fix}}_{m,t} + \sigma_t)\, a_m(h)$. Accounting for the refinancing hazard ρ, the expected payment is $(i^{\text{fix}}_{m,t} + \sigma_t)\, a_m(h)\, (1 - \rho)^h$. Log-linearizing the real cost (nominal payment divided by P_{t+h}), the marginal contribution with respect to $\mathbb{E}_t\pi_{t+h}$ is $-\beta^h(1-\rho)^h a_m(h)$. The present value for maturity m is

$$PV_m = \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h) \left[i^{\text{fix}}_{m,t} + \sigma_t - \mathbb{E}_t\pi_{t+h}\right]. \tag{A.1}$$

Averaging over maturities: $PV^{\text{fix}}_t = \sum_{m=1}^{\bar{m}} \Omega(m)\, PV_m$.

Step 2: User cost. The log-linearized financing component of the tangible user cost is

$$\tilde{uc}^{\text{finance}}_{T,t} \approx \gamma_T \left[\omega\, \tilde{PV}^{\text{fix}}_t + (1-\omega)\,\lambda\big(i^{\text{flo}}_t - \mathbb{E}_t\pi_t\big)\right], \tag{A.2}$$

where $\tilde{PV}^{\text{fix}}_t$ contains terms loading on interest and inflation expectations.

Step 3: Investment rule. With convex adjustment costs $\Phi_j(\cdot)$, investment satisfies

$$\tilde{x}_{j,t} = -\Gamma_j \tilde{uc}_{j,t}, \qquad \Gamma_j \equiv \left[\Phi''_j(\delta_j)\right]^{-1} > 0, \tag{A.3}$$

where $j \in \{T, I\}$ indexes capital type.

Step 4: Sensitivity to horizon-H shock. From equation (3) in the main text, the cross-horizon loading is

$$w_{h|H} := \frac{\partial \mathbb{E}_t\pi_{t+h}}{\partial \mathbb{E}_t\pi_{t+H}} = \frac{\Delta\ell_t + \Delta s_t e^{-\kappa h}}{\Delta\ell_t + \Delta s_t e^{-\kappa H}} \geq 0. \tag{A.4}$$

Each $\mathbb{E}_t\pi_{t+h}$ enters PV^{fix}_t with coefficient $-\beta^h(1-\rho)^h a_m(h)$, so

$$\frac{\partial \tilde{PV}^{\text{fix}}_t}{\partial \mathbb{E}_t\pi_{t+H}} = -\sum_{m=1}^{\bar{m}} \Omega(m) \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h)\, w_{h|H}. \tag{A.5}$$

The floating-rate term depends only on $H = 0$. Combining:

$$\frac{\partial \tilde{uc}_{T,t}}{\partial \mathbb{E}_t\pi_{t+H}} = -\gamma_T \left[\omega \sum_{m=1}^{\bar{m}} \Omega(m) \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h) w_{h|H} + (1-\omega)\lambda\, \mathbf{1}\{H=0\}\right]. \tag{A.6}$$

Therefore,

$$\frac{\partial x_{T,t}}{\partial \mathbb{E}_t\pi_{t+H}} = \Gamma_T\gamma_T \left[\omega \sum_{m=1}^{\bar{m}} \Omega(m) \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h) w_{h|H} + (1-\omega)\lambda\, \mathbf{1}\{H=0\}\right] \equiv \Gamma_T W(H), \tag{A.7}$$

where

$$W(H) := \gamma_T \left[\omega \sum_{m=1}^{\bar{m}} \Omega(m) \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h) w_{h|H} + (1-\omega)\lambda\, \mathbf{1}\{H=0\} \right]. \tag{A.8}$$

This matches equation (13) in Section 6.3 of the main text.

C.2 Auxiliary Results

Define the kernel

$$K(H) := \sum_{m=1}^{\bar{m}} \Omega(m) \sum_{h=0}^{m-1} \beta^h (1-\rho)^h a_m(h)\, w_{h|H}, \tag{A.9}$$

so that $W(H) = \gamma_T[\omega K(H) + (1-\omega)\lambda\, \mathbf{1}\{H=0\}]$.

Lemma 1 (Kernel Monotonicity)**.** *$K(H) \geq 0$ and $H \mapsto K(H)$ is weakly increasing. If $\Delta s_t > 0$, then $K(H)$ is strictly increasing in H.*

Proof. All terms in $K(H)$ are non-negative by construction. As H increases, $e^{-\kappa H}$ decreases, so the denominator in $w_{h|H}$ weakly decreases, implying $w_{h|H}$ weakly increases. Since $K(H)$ is a weighted average of $w_{h|H}$ with non-negative weights, it is weakly increasing. Strictness follows when $\Delta s_t > 0$. □

Lemma 2 (Properties of $W(H)$)**.** *$W(H) \geq 0$ for all H. If $\omega > 0$, then $W(H)$ is weakly increasing in H (strictly if $\Delta s_t > 0$).*

Proof. Non-negativity follows from Lemma 1 and $W(H) = \gamma_T[\omega K(H) + (1-\omega)\lambda\, \mathbf{1}\{H=0\}]$. For $H > 0$, the indicator vanishes and $W(H) = \gamma_T \omega K(H)$, so monotonicity follows from Lemma 1. □

C.3 Proofs of Propositions

Proof of Proposition 1 (Tangible-Intangible Wedge). From the production complementarity $F_{TI} > 0$, intangible investment responds to tangible user cost changes with elasticity $\zeta \in [0, 1)$. Combined with $\gamma_I \approx 0$ (intangibles are not debt-financed), the semi-elasticity for intangibles is

$$\frac{\partial x_{I,t}}{\partial \mathbb{E}_t \pi_{t+H}} = \zeta\, \Gamma_T W(H).$$

Since $\zeta < 1$, this is strictly less than $\partial x_{T,t} / \partial \mathbb{E}_t \pi_{t+H} = \Gamma_T W(H)$. Non-negativity follows from Lemma 2. □

Proof of Proposition 2 (Rising Horizon Profile). From (A.8), for $H > 0$ we have $W(H) = \gamma_T \omega K(H)$. Since γ_T, ω are constants,

$$\frac{\partial W(H)}{\partial H} = \gamma_T \omega \frac{\partial K(H)}{\partial H} \geq 0,$$

with strict inequality when $\Delta s_t > 0$ by Lemma 1. At $H = 0^+$, the right derivative is non-negative since $K(H)$ is continuous and weakly increasing, while the floating-rate term $(1-\omega)\lambda \geq 0$ does not contribute to the slope for $H > 0$. □

Proof of Proposition 3 (Leverage Non-Monotonicity). Let $R(L) := \Gamma_T W(H; \gamma_T(L), \sigma(L))$ denote the investment response as a function of leverage. By the chain rule,

$$R'(L) = \Gamma_T \left(\frac{\partial W}{\partial \gamma_T} \gamma_T'(L) + \frac{\partial W}{\partial \sigma} \sigma'(L) \right).$$

From the model, W is increasing in γ_T (more external finance amplifies the channel) and decreasing in σ (higher spreads increase financing costs). Thus $\partial W/\partial \gamma_T > 0$ and $\partial W/\partial \sigma < 0$.

Since $\gamma_T(L)$ is concave, $\gamma_T'(L)$ is decreasing in L. Since $\sigma(L)$ is convex, $\sigma'(L)$ is increasing in L. At low leverage, the credit spread is flat ($\sigma' \approx 0$) while the pledgeability benefit is steep (γ_T' large), so $R'(L) > 0$. At high leverage, financial distress dominates: σ' is large while γ_T' is small (approaching zero), so $R'(L) < 0$. By continuity, there exists an interior maximum L^*, establishing the hump shape. □

C.4 Connection to Empirical Specifications

The theoretical semi-elasticity $\partial x_{T,t}/\partial \mathbb{E}_t \pi_{t+H} = \Gamma_T W(H)$ corresponds to the coefficient β_H in our empirical specification. The rising horizon profile (Proposition 2) predicts β_H increases with H, which we test by comparing responses across forecast horizons. The tangible-intangible wedge (Proposition 1) predicts larger coefficients for tangible investment, tested via equation (2) in Section 5. The leverage non-monotonicity (Proposition 3) motivates our heterogeneity analysis by firm leverage quartiles.

Supplemental Appendix

Beliefs on the Origins of Inflation

Firms disagree on the sources of inflation. We examine the economic consequences of that disagreement.

We develop a strategy, based on an supply-demand logic, which aims to distinguish between firms' beliefs on whether inflation was driven by either demand or supply shocks. Through SIGE data, it is possible to know whether firms anticipate an increase in demand for their own products as well as in their selling prices. Expectations on selling prices are available for the one-year forecast horizon, while expectations on demand have a three- month horizon. Based on these variables, we group firms into four distinct bins: those who believe inflation to be driven by either (1) positive demand (positive expected demand, and positive expected prices), or (2) negative supply (negative expected demand, and positive expected prices); and those who anticipate inflation to be driven by either (3) positive supply (positive expected demand, and negative expected prices), or (4) negative demand (negative expected demand, and negative expected prices).

	$\mathbb{E}_{it}\Delta P_{i,12} > 0$	$\mathbb{E}_{it}\Delta P_{i,12} \leq 0$
$\mathbb{E}_{it}\Delta Y_{i,3} > 0$	(1) Positive Demand	(3) Positive Supply
$\mathbb{E}_{it}\Delta Y_{i,3} \leq 0$	(2) Negative Supply	(4) Negative Demand

Figure S1 shows the time series of the four groups. We show that time-series of these four groups well captures the historical economic trends, such as the bottlenecks in supply that have arisen due to the economic closures in response to the global pandemic, the subsequent surge in demand with the reopening of economies, and the 2022 energy crisis, which has resulted in another wave of negative supply. The proportion of firms with a view that is coherent with negative demand increased from 40% to over 50% during the first quarter of 2020. This percentage remained elevated until the second quarter of 2021, when the economy began to gradually reopen. During this period, firms that expected positive demand increased from 15% to nearly 40%. The 2022-2023 energy crisis, which originated from the Ukranian-Russian conflict, is evident from the widening of the red area: from a lowest of 20% in 2021Q2, the percentage of firms forecasting a negative supply reached almost 40% at the end of 2022.

When firms expect a surge in selling prices and a decrease in demand of their products, we interpret this as a cost-push view of inflation. Conversely, if the expected increase in prices is accompanied by a rise in demand, firms expect a demand-driven inflation. We exploit these variables to examine whether firms that have a "demand view", rather than a "cost-push view",

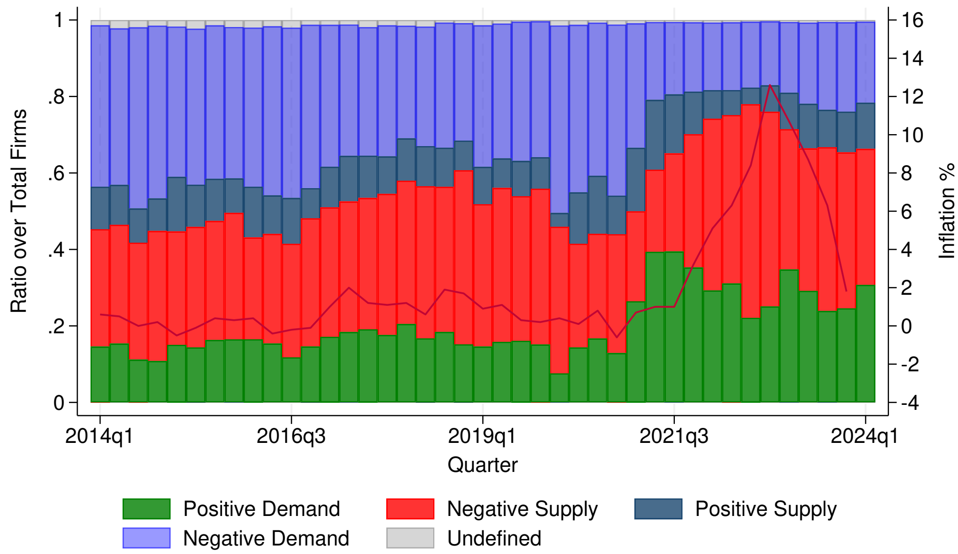


Figure S1

invest more in response to higher long-term inflation expectations. In particular, we create a dummy variable, $D-Inflation$, which has value 1 for firms in group (1) and 0 for those in group (2). The variable is designed to capture firms which believe inflation to be demand-driven.

We interact the aforementioned variables with long-term inflation expectations, and run the IV-2SLS specification. Table S1 reports the results of a regression in which long-term inflation expectations are instrumented by beliefs on demand for own goods (ΔY) and on selling prices (ΔP) as well as by a demand-driven inflation dummy (D-Inflation). All the controls are included and standard errors are clustered at the firm-year level. Column (1) shows that, when long-term inflation expectations increase by 1%, firms that expect an increase in the demand for their own products increase their intangible investment by 0.06 ppt more than firms that expect the demand to be unaltered. The coefficient is significant at 1% confidence level for intangibles. Tangibles do not experience a significant variation (column 4). Conversely, firms that expect an upward pressure on their selling prices significantly increase tangibles 0.16 ppt more than firms that do not expect a surge (column 5). Intangibles do not experience a significant variation (column 2). Finally, we observe an increase of tangible capital which is 0.12 ppt bigger for firms that expect inflation to be demand-driven rather than supply driven (column 6). The coefficient is significant at 10% confidence level.

Table S1: Beliefs on Demand vs Supply-driven Inflation

	$Intangible\ Inv_{t+1}/Assets_{t+1}$			$Tangible\ Inv_{t+1}/Assets_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{E}\pi_5 \times (\Delta Y > 0)$	0.061^{***}			0.092		
	(0.021)			(0.056)		
$\mathbb{E}\pi_5 \times (\Delta P > 0)$		0.014			0.154^{***}	
		(0.022)			(0.055)	
$\mathbb{E}\pi_5 \times$ D-Inflation			0.036			0.122^{*}
			(0.023)			(0.064)
$\mathbb{E}\pi_5$	-0.027^{*}	-0.014	-0.046^{***}	0.066^{*}	-0.019	0.107^{**}
	(0.015)	(0.022)	(0.017)	(0.039)	(0.053)	(0.049)
Constant	-48.140^{***}	-50.787^{***}	-70.660^{***}	-143.174^{***}	-136.948^{***}	-116.740^{**}
	(13.048)	(12.969)	(16.471)	(34.752)	(34.544)	(45.616)
Observations	11175.000	11201.000	7042.000	11175.000	11201.000	7042.000
Adj R-squared	0.002	0.002	0.003	0.017	0.018	0.014
Firm, Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes	Yes
Business Sentiment	Yes	Yes	Yes	Yes	Yes	Yes
Credit Access and Liquidity	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains results of the second stage of IV-2SLS regression, where instrumented expectations are interacted with expected change in demand for own goods (column 1 and 4), expected change in selling prices (column 2 and 5), demand-driven inflation dummy (column 3 and 6). Columns 1-3 run the analysis for intangibles, while columns 4-6 for tangibles. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Additional Figures and Tables

Table S2: Investments, OLS

	$\text{Inv}_{t+1}/Asset_t$ (OLS)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.071				
	(0.043)				
$\mathbb{E}\pi_{1y}$		0.067			
		(0.042)			
$\mathbb{E}\pi_{2y}$			0.087^{**}		
			(0.041)		
$\mathbb{E}\pi_{3-5y}$				0.096^{**}	
				(0.040)	
$\mathbf{1}(t < 2021) \times \mathbb{E}\pi_{3-5y}$					0.366^{***}
					(0.088)
$\mathbf{1}(t \geq 2021) \times \mathbb{E}\pi_{3-5y}$					0.074^{**}
					(0.038)
$\mathbf{1}(t \geq 2021)$					1.022^{***}
					(0.185)
Observations	9224.000	9224.000	9224.000	9224.000	9224.000
Adj R-squared	0.016	0.016	0.016	0.016	0.017
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains estimates of an OLS regression of investments on inflation expectations. Panel A reports coefficients for intangibles, while panel B for tangibles. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table S3: Tangible Investments, OLS

	Tangible $\text{Inv}_{t+1}/Asset_t$ (OLS)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	0.105^{***}				
	(0.038)				
$\mathbb{E}\pi_{1y}$		0.101^{***}			
		(0.037)			
$\mathbb{E}\pi_{2y}$			0.106^{***}		
			(0.036)		
$\mathbb{E}\pi_{3-5y}$				0.103^{***}	
				(0.035)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					0.308^{***}
					(0.075)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.075^{**}
					(0.033)
$\mathbf{1}(t \geq 2021)$					0.754^{***}
					(0.158)
Observations	9224	9224	9224	9224	9224
Adj R-squared	0.017	0.017	0.017	0.017	0.018
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains estimates of an OLS regression of investments on inflation expectations. Panel A reports coefficients for intangibles, while panel B for tangibles. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Table S4: Intangible Investments, OLS

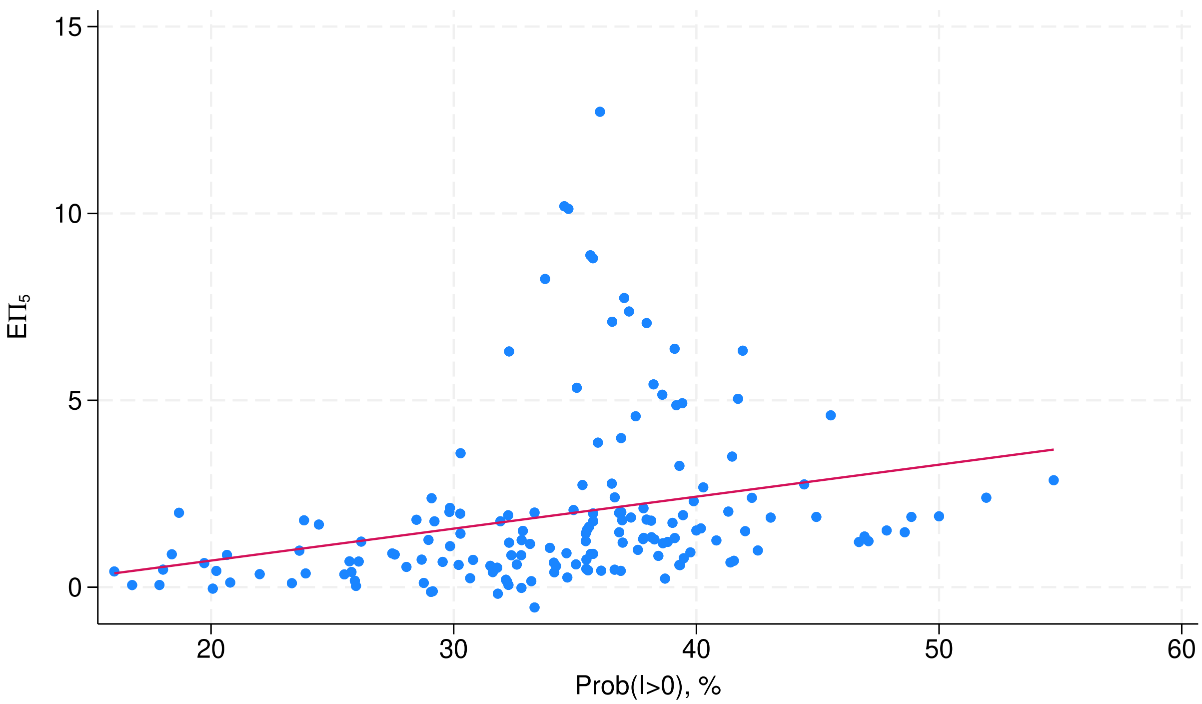
	Intangible $\text{Inv}_{t+1}/Asset_t$ (OLS)				
	(1)	(2)	(3)	(4)	(5)
$\mathbb{E}\pi_{6m}$	-0.024*				
	(0.014)				
$\mathbb{E}\pi_{1y}$		-0.025*			
		(0.013)			
$\mathbb{E}\pi_{2y}$			-0.016		
			(0.012)		
$\mathbb{E}\pi_{3-5y}$				-0.010	
				(0.012)	
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t < 2021)$					0.036
					(0.028)
$\mathbb{E}\pi_{3-5y} \times \mathbf{1}(t \geq 2021)$					0.000
					(0.011)
$\mathbf{1}(t \geq 2021)$					0.197***
					(0.059)
Observations	9224	9224	9224	9224	9224
Adj R-squared	0.003	0.003	0.003	0.002	0.002
Firm, Time FE	Yes	Yes	Yes	Yes	Yes
Macroeconomic Outlook	Yes	Yes	Yes	Yes	Yes
Credit Access	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. Errors are clustered at the firm and time level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The table contains estimates of an OLS regression of investments on inflation expectations. Panel A reports coefficients for intangibles, while panel B for tangibles. Controls include macro-economic outlook, business sentiment, firm's credit access and liquidity. Firm, and time FEs are included. The sample is restricted to yearly observations in 2014Q1-2023Q4. Standard errors, in parentheses, are clustered at firm×quarter level.

Figure S2: Long-term Inflation Expectations and Investment Plans



Notes: This figure plots long-term inflation expectations against investment plans measured as the probability of increasing investments. Quarterly data from SIGE in 2014Q1-2023Q4 are employed.

A On Horizon-Specific IV with a Single Instrument

One concern with our approach is that, because the instrument shifts longer-horizon beliefs less than short-horizon beliefs (a smaller first stage at distant horizons), and because we use a single instrument, the IV estimates would mechanically decline with horizon. This is incorrect.

Our estimation is horizon-specific: for each horizon H, we estimate a first stage π_H^{FS} that maps the instrument $\widetilde{Treat}_{it}$ to the belief at horizon H, $\pi_H^{FS} : \widetilde{Treat}_{it} \rightarrow \mathbb{E}_{it}\pi_{t+H}$, and a reduced form π_H^{RF} that maps $\widetilde{Treat}_{it}$ to investment, $\pi_H^{RF} : \widetilde{Treat}_{it} \rightarrow Inv_{i,t+1}$. The IV semi-elasticity at horizon H is then the ratio $\hat{\psi}_H = \pi_H^{RF}/\pi_H^{FS}$.

A key insight is that directional reasoning about the first stage is misleading. Consider a thought experiment: holding the reduced form fixed at π^{RF} for all horizons, a smaller first stage would *increase*, not decrease, the IV ratio. More generally, for a declining first stage to produce declining IV estimates, the reduced form would need to fall sufficiently fast with horizon to dominate the first-stage pattern. A single instrument can identify a full horizon profile of responses when the first stage varies by horizon; this is the same logic as local projection IV or event-study IV, where one shock traces out dynamic responses at multiple horizons.

Empirically, our reduced forms π_H^{RF} rise with horizon alongside the IV estimates (results available upon request). This confirms that the larger long-horizon IV effects are not an artifact of scaling a flat or declining reduced form by a shrinking first stage. Instead, they reflect a core economic finding: while shocks to long-horizon beliefs are harder to induce, they have disproportionately powerful causal effects on investment.