

Article

Cost of Debt Financing and Corporate Investment in the EU-27: Deleveraging and Profit Buffers Under Monetary Tightening

Vanya Georgieva ^{1,*}  and Radosveta Krasteva-Hristova ² ¹ Faculty of Economics, Agricultural University-Plovdiv, 4000 Plovdiv, Bulgaria² Department of Accounting, Tsenov Academy of Economics, 5250 Svishtov, Bulgaria;
r.krasteva@uni-svishtov.bg

* Correspondence: v.georgieva@au-plovdiv.bg

Abstract

The sharp rise in nominal interest rates after 2022 constitutes a substantial test for European non-financial corporations after a prolonged period of exceptionally cheap debt. This paper examines how the cost of debt financing—proxied by the lagged, ex post real long-term sovereign yield, interpreted throughout as an indicator of economy-wide financing conditions rather than a direct corporate borrowing rate—is associated with the gross investment rate of non-financial corporations in the EU-27 over 2000–2025, using harmonised annual sector accounts and two-way fixed-effects panel models, interaction designs and local projections. Three findings emerge. First, the conditional association is stronger for the real than for the nominal cost of debt: a one percentage point increase in the lagged real yield is associated with a decline of roughly 0.3–0.4 percentage points in the investment rate, and a formal test does not reject treating the nominal yield and inflation as components of the real rate. Second, this association is not stable over time: it weakens markedly after 2020, and the weakening is robust to an alternative 2022 breakpoint and to wild cluster bootstrap inference. Third, direct tests with predetermined leverage and profit shares do not account for this weakening, so stronger corporate balance sheets—including the pronounced deleveraging from around 477% to around 226% of income—remain only one candidate explanation among several. The profit-share interaction is positive, but the evidence of attenuation is weak and specification-dependent: it is not statistically significant with the one-year-lagged measure and reaches only marginal significance under two alternative measures.

Keywords: cost of debt financing; corporate investment; non-financial corporations; deleveraging; profit buffers; monetary tightening; EU-27

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1. Introduction

After more than a decade of exceptionally cheap debt, European non-financial corporations enter a new interest rate environment. Since 2022 nominal interest rates have risen sharply, and the yield on long-term government securities in the EU member states increased from an average of 0.5% in 2020–2021 to 3.3% in 2022–2025 ([Eurostat, 2026](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&code=sdg_8_4_1)). This repricing affects not only government financing but also the broader conditions under which firms access debt capital.

For corporate finance this period matters, because it once again raises a fundamental question: how does a higher cost of debt affect the investment decisions of firms? The

answer does not depend solely on the level of interest rates. It also depends on the financial condition of the firms themselves—how indebted they are, what profit buffers they hold, and to what extent they are able to finance their investment out of internal funds. Classical theory in corporate finance—from the neutrality conditions of Modigliani and Miller (1958), through the debt overhang argument of Myers (1977), to the literature on financial constraints (Fazzari et al., 1988) and the financial accelerator (Bernanke & Gertler, 1989)—implies that a rise in the cost of external financing constrains investment. This effect should be stronger for firms with higher leverage and weaker internal financial buffers. The post-2022 episode offers a rare opportunity to confront these predictions with data, because it combines the sharpest nominal repricing in two decades with historically atypical real financing conditions and with corporate balance sheets that differ markedly from those of earlier tightening episodes. Recent evidence confirms that the transmission of monetary policy to corporate investment is highly heterogeneous. Investment responses vary with leverage, debt maturity, liquidity, ownership structure, access to bank credit and the availability of market-based financing (Durante et al., 2022; Cloyne et al., 2023; von Rüden et al., 2023; Grundy et al., 2024; Canofari et al., 2025; González & Cárdenas, 2026). This heterogeneity is particularly relevant for the EU after 2022, because firms entered the tightening cycle with substantially different balance-sheet positions and financing structures.

The present paper tests these relationships for the 27 EU member states over the period 2000–2025 using a harmonised panel of annual sector accounts compiled under the European System of Accounts 2010 framework (European Union, 2013), hereafter referred to as ESA 2010. The analysis focuses on non-financial corporations and addresses three main questions. First, how do changes in the cost of debt financing, measured by the long-term Maastricht criterion bond yield, affect the gross investment rate of non-financial corporations? Second, does this relationship depend on the leverage and the profit buffers of the corporate sector? Third, does the strength of the transmission change over time, particularly during the period of monetary tightening after 2022? To the best of our knowledge, no existing study addresses these questions on fully harmonised sector accounts covering the entire cycle from the low-rate era through 2025 for all twenty-seven member states: firm-level studies typically end before the tightening episode or cover subsets of countries, while macroeconomic studies of transmission rarely link financing costs to the corporate sector's own balance-sheet position. The present paper is intended to fill this gap.

The paper makes three main contributions. First, to the best of our knowledge, it provides the first estimate of the relationship between financing costs and corporate investment in the EU-27 on harmonised sector accounts spanning the full cycle from the low-rate era through 2025, linking the firm-level literature on financing constraints with the macroeconomic literature on transmission. Second, it draws a sharp distinction between the nominal and the real cost of debt and supports it with a formally reported restriction test: the post-2022 shock is highly visible in nominal terms, whereas its real counterpart is far more moderate owing to the surge in inflation, and the two should not be conflated. Third, it documents that the sensitivity of corporate investment to real financing costs is not constant over time—it weakens markedly after 2020—and it subjects the natural balance-sheet explanation of this change to a direct test with predetermined leverage and profitability measures, showing that the observed balance-sheet variables do not account for the change. The vulnerability of the corporate sector to interest rate shocks thus emerges as time-varying and only partially understood, which carries implications for how capital structure, leverage and internal sources of financing should be read as determinants of firms' investment capacity and risk exposure.

2. Literature Review and Hypotheses

2.1. Cost of Debt Financing and Corporate Investment

The investment decisions of firms depend on the expected return on projects and on the cost of the financing through which these projects are carried out. In neoclassical theory the cost of capital is a key determinant of the desired level of investment: when it rises, some investment projects no longer cover the required rate of return and may be postponed or abandoned (Jorgenson, 1963; Tobin, 1969; Hayashi, 1982). This relationship is particularly important in the case of debt financing, since higher interest rates increase future debt servicing costs and raise the threshold at which an investment is economically justified.

The classical proposition of Modigliani and Miller (1958) holds that, under perfect capital markets, the method of financing does not affect the value of the firm or its investment decisions. In the real economy, however, these conditions are rarely met. Taxes, information asymmetry, the costs of financial distress and limited access to external capital make external financing more expensive than internal financing. The cost of debt may therefore be systematically related to the investment behaviour of firms.

The literature on financial constraints emphasises that firms are not always free to finance all projects with a positive net present value. Fazzari et al. (1988) show that the investment of financially constrained firms depends more strongly on internal cash flows. Hubbard (1998) summarises this line of research and points out that capital market imperfections create a wedge between internal and external financing. At the same time, Kaplan and Zingales (1997) and Gilchrist and Himmelberg (1995) caution that the sensitivity of investment to cash flow must be interpreted carefully, since it may reflect both financial constraints and investment opportunities. Later studies likewise confirm that financially constrained firms are more sensitive to external financing conditions and more often accumulate liquidity buffers (Almeida et al., 2004; Whited & Wu, 2006).

A rise in the cost of debt also affects investment through the credit channel. Under information asymmetry, lenders may restrict access to credit or require a higher risk premium, rather than simply providing financing at a higher interest rate (Stiglitz & Weiss, 1981). The literature on the financial accelerator points in the same direction, arguing that the financial condition of firms affects the cost of external financing and may amplify initial economic shocks (Bernanke & Gertler, 1989; Bernanke et al., 1999). Empirical studies show that such effects are stronger for firms with more limited access to capital markets, lower liquidity and greater dependence on bank credit (Gertler & Gilchrist, 1994; Duchin et al., 2010).

For the present study, the distinction between the nominal and the real cost of debt is important. Nominal interest rates show the current price of borrowed funds, but the real burden of debt also depends on inflation. When inflation is high, nominal interest rates may rise without the real cost of financing increasing to the same extent. From the perspective of firms, it is precisely the real cost of debt that comes closer to the economic burden of future payments and to the real return that an investment project must deliver.

Recent empirical evidence reinforces this theoretical prediction while also showing that the strength of the relationship varies across firms and financing environments. Durante et al. (2022) document heterogeneous firm-level investment responses to changes in monetary-policy conditions, while Cloyne et al. (2023) show that corporate financial structure plays an important role in the transmission from monetary policy to investment. Gulen et al. (2024) further identify systematic links between credit-market expectations, corporate debt issuance and investment, indicating that financing conditions may influence investment both through the user cost of capital and through firms' expectations regarding future credit availability. Taken together, this evidence connects the neoclassical investment framework with the financial-constraints literature: a higher real financing cost raises the

required return on investment projects, while restricted access to external funds may further limit firms' ability to undertake otherwise viable investment.

It may therefore be expected that a higher real cost of debt financing is associated with lower investment activity by non-financial corporations. A higher real financing cost raises the required rate of return, reduces the set of economically viable projects and may be accompanied by the postponement or cancellation of part of planned investment. On this basis, the first hypothesis is formulated:

H1. *A higher real cost of debt financing is associated with a lower gross investment rate of non-financial corporations.*

2.2. Corporate Leverage and the Balance-Sheet Channel

Leverage is one of the principal characteristics through which the financial condition of firms affects their investment decisions. Under perfect capital markets, the level of debt should not alter investment behaviour if the firm has projects with a positive net present value (Modigliani & Miller, 1958). In the real economy, however, high leverage creates financial constraints, raises the risk borne by lenders and may reduce the ability of firms to finance new investment.

One of the main mechanisms is the so-called debt overhang. According to Myers (1977), when a firm already carries a high level of debt, part of the future benefits from new investment effectively accrues to the existing creditors. This may discourage owners and managers from undertaking new investment projects, even when these are economically efficient. Agency theory likewise shows that debt may give rise to conflicts between shareholders and creditors, since the various parties have different incentives with respect to risk and to the investment policy of the firm (Jensen & Meckling, 1976; Smith & Warner, 1979).

Leverage also affects investment through the balance sheet channel. When firms are more heavily indebted, they face higher fixed payments, less free cash flow and a more limited capacity to take on new debt. This impairs their creditworthiness and raises the external finance premium. In the financial accelerator literature, the financial condition of firms is central to the way in which external shocks are transmitted to the real economy. Weaker balance sheets increase the external finance premium and amplify the fall in investment under adverse financial conditions (Bernanke & Gertler, 1989; Bernanke et al., 1999; Kiyotaki & Moore, 1997).

Empirical studies confirm that higher leverage is often associated with lower investment activity. Whited (1992) shows that liquidity and debt constraints affect corporate investment. Lang et al. (1996) find that high leverage restrains investment and growth, particularly in firms with weaker investment opportunities. Similar results are reported by Aivazian et al. (2005), according to whom leverage has a negative effect on investment, and this effect is stronger in firms with lower growth opportunities. Hennessy (2004) likewise shows that debt overhang may distort investment behaviour, while Almeida and Campello (2007) emphasise the role of assets that can serve as collateral.

This mechanism becomes particularly important when the cost of debt rises. When real interest rates increase, highly indebted firms may be affected through several channels at once: the cost of new financing increases, the burden of refinancing existing debt grows, and lenders may demand higher risk premia. Under such conditions, more highly leveraged firms may exhibit a stronger investment response by postponing or curtailing investment expenditure. Recent evidence further shows debt maturity and firm-level financial structure condition investment responses to monetary-policy shocks (Auer et al., 2021; Holm-Hadulla & Thürwächter, 2021; Deng & Fang, 2022; Durante et al., 2022; Cloyne et al., 2023; Canofari et al., 2025). This evidence suggests that leverage alone may not fully capture balance-sheet exposure, because the maturity and composition of outstanding

debt also determine the speed and strength with which changing financing conditions are transmitted to corporate investment. Studies covering periods of financial crisis also show that firms with greater dependence on external financing and weaker balance sheets tend to reduce investment more sharply during credit tightening (Duchin et al., 2010; Campello et al., 2010; Kalemli-Özcan et al., 2022). More recent evidence indicates that the investment implications of corporate debt depend jointly on leverage, liquidity and the phase of the economic cycle. González and Cárdenas (2026) show that liquidity conditions can either amplify or moderate the relationship between corporate debt and investment across cyclical states. This finding reinforces the interpretation of the balance-sheet channel as a conditional mechanism rather than as an automatic consequence of higher leverage.

For the present study, this means that the effect of the real cost of debt on investment should not be treated as uniform across all firms and periods. If the corporate sector is heavily indebted, an increase in the real cost of financing should have a stronger negative effect on the investment rate. Conversely, if firms have gone through a period of deleveraging and have reduced their debt burden, the balance sheet channel may be weaker. On this basis, the second hypothesis is formulated:

H2. *The negative effect of the cost of debt on investment strengthens with the lagged leverage of the corporate sector.*

2.3. Profit Buffers and Internal Financing Capacity

Alongside leverage, profitability is another key factor through which the financial condition of firms affects their investment decisions. Higher profit not only signals better current performance, but also creates an internal financial resource that can be used to fund investment. This is particularly important in periods when external financing becomes more expensive or access to credit becomes more limited.

The pecking order theory offers one of the main interpretations of this relationship. According to Myers and Majluf (1984), firms prefer to use internally generated funds first, then debt, and only lastly new equity. The reason is that external financing is associated with information asymmetry, higher transaction costs and a possible adverse market reaction. In this sense, firms with stronger profit buffers are less dependent on external sources and can sustain their investment activity even when the cost of debt rises. Recent evidence from the European deleveraging period provides additional support for examining profitability and internal financing within this theoretical framework. Using firm-level evidence from Italy, Zeli and Bini (2025) show that financing decisions during deleveraging reflect the interaction of profitability, internal funds and leverage-adjustment considerations, with elements consistent with both pecking-order and trade-off explanations. Their results support treating profitability as an important source of internal financing capacity, while also cautioning against interpreting it as a direct measure of accumulated liquidity.

The literature on financial constraints likewise emphasises the importance of internal financing. Fazzari et al. (1988) show that the investment of financially constrained firms is more sensitive to internal cash flows. Hubbard (1998) summarises this finding, noting that capital market imperfections make internal funds more valuable to firms. At the same time, Kaplan and Zingales (1997) and Cleary (1999) show that the relationship between cash flow and investment is not unambiguous and must be interpreted carefully. Nevertheless, the general logic remains important: when external financing is expensive, firms with greater internal financial resources have more freedom to invest.

Internal financing capacity may also perform a protective function by reducing firms' immediate dependence on new external debt and by supporting investment when credit conditions deteriorate. Almeida et al. (2004) show that financially constrained firms tend to retain more cash out of incremental cash flows, while Denis and Sibilkov (2010) emphasise

the value of liquid reserves for firms with limited access to external financing. These studies concern cash and liquidity stocks rather than the gross profit share used in the present study; nevertheless, they support the broader proposition that stronger internally generated resources may reduce exposure to adverse financing conditions.

Under monetary tightening, this role becomes even more important. When the real cost of debt rises, firms with weaker profit buffers are more directly exposed to the increased cost of external financing. They must either accept a higher price of credit or scale back their investment plans. Conversely, firms with a higher profit share can partly substitute internal funds for external financing. This reduces the sensitivity of their investment to changes in the interest rate environment.

Empirical studies of financial crises confirm this mechanism. [Duchin et al. \(2010\)](#) find that firms with lower liquidity and greater dependence on external financing cut their investment more sharply during a credit shock. [Campello et al. \(2010\)](#) likewise show that financially constrained firms make deeper cuts to investment, employment and technology spending when access to capital is restricted. Such results support the view that internal financial buffers can mitigate the real effects of a deterioration in financial conditions.

For the present study, this means that profitability should not be regarded solely as a direct determinant of the level of investment. Its mitigating role is more important. A high gross profit share may reduce the dependence of firms on debt financing and thereby weaken the negative effect of a higher real cost of debt on investment. On this basis, the third hypothesis is formulated:

H3. *A higher gross profit share mitigates the negative effect of the cost of debt on investment.*

2.4. Monetary Tightening, Deleveraging and Corporate Resilience

The relationship between the cost of debt and corporate investment is not constant over time. It depends on the macro-financial environment, on the state of the financial system and on the balance sheets of firms themselves. Under monetary tightening, interest rates rise, lending conditions deteriorate and new financing becomes more expensive. This usually leads to weaker investment activity, particularly among firms that depend to a greater extent on external debt.

The literature on monetary policy transmission shows that the effects of interest rate changes are passed through to the real economy via several channels. The classical interest rate channel affects investment through the cost of capital, while the credit channel operates through access to bank financing and the external finance premium ([Bernanke & Blinder, 1992](#); [Kashyap et al., 1993](#); [Kashyap & Stein, 2000](#)). Under tighter financial conditions, banks may restrict lending or raise risk premia, which affects those firms without ready access to capital markets particularly strongly.

Corporate balance sheets are central to the strength of this transmission. The financial accelerator implies that weaker balance sheets amplify the initial shocks, since a deterioration in the net worth of firms raises the cost of external financing and constrains investment ([Bernanke & Gertler, 1989](#); [Bernanke et al., 1999](#)). Conversely, when firms enter a period of monetary tightening with lower leverage, better liquidity and more stable profitability, the negative effect on investment may be weaker. This means that the same change in the interest rate environment may have different real consequences depending on the initial financial condition of the corporate sector.

Deleveraging is of particular significance in this context. When firms reduce their debt burden, they limit refinancing risk, lower future fixed payments and improve their capacity to absorb temporary financial shocks. High leverage, by contrast, may lead to debt overhang, in which firms refrain from new investment because a substantial part of the future benefits will accrue to the existing creditors ([Myers, 1977](#); [Hennessy, 2004](#)).

In the European context, studies of the period after the debt crisis show that the debt burden, refinancing risk and weak balance sheets can constrain corporate investment for a prolonged period (Kalemli-Özcan et al., 2022).

Profit buffers complement this mechanism. Firms with higher profitability can more easily finance investment out of their own funds and are less dependent on new debt. This is particularly important in periods of monetary tightening, when external financing becomes more expensive. Internal financial resources can thus act as a protective buffer that allows firms to preserve part of their investment activity despite a less favourable interest rate environment (Fazzari et al., 1988; Hubbard, 1998; Almeida et al., 2004; Denis & Sibilkov, 2010).

This perspective matters for the present study, because the most recent episode of monetary tightening in the EU comes after a long period of low interest rates, restructuring of corporate balance sheets and a gradual reduction in the leverage of non-financial corporations. The effect of higher nominal interest rates after 2022 therefore cannot be interpreted mechanically. What matters is not only the rise in interest rates itself, but also the real cost of debt, the level of corporate leverage and the availability of internal profit buffers.

It is precisely here that the gap in the literature addressed by this paper emerges. Recent studies provide detailed firm-level evidence that investment responses to monetary-policy changes differ according to leverage, debt maturity, liquidity, ownership structure and access to bank or bond financing (Auer et al., 2021; Holm-Hadulla & Thürwächter, 2021; Deng & Fang, 2022; Durante et al., 2022; Cloyne et al., 2023; von Rüden et al., 2023; Pelizzon et al., 2024; Canofari et al., 2025; Benlialper, 2026; Canofari et al., 2026). Credit-market expectations and the interaction between sovereign and corporate debt markets provide further sources of variation in corporate financing and investment (Grundy et al., 2024; Gulen et al., 2024). Far less attention, however, has been devoted to how a single harmonised sector-account investment measure co-moves with a comparable financing-conditions proxy across all EU-27 members over a long period that includes both the low-rate era and the post-2022 tightening cycle. This is especially important for the EU-27 after 2022, when nominal financial conditions tighten sharply, but the real cost of debt and the state of corporate balance sheets do not move in the same direction across all countries.

The present study therefore examines the investment response of non-financial corporations not only as an outcome of the change in the cost of debt, but also as a function of their prior financial resilience. In this way the paper links the literature on corporate investment, capital structure and monetary policy transmission, placing the emphasis on when and why more expensive financing becomes a real constraint on investment.

3. Materials and Methods

3.1. Data and Variables

The empirical analysis uses annual data for the EU member states over the period 2000–2025. The data are combined into a country-year panel, which makes it possible to trace both the differences between individual countries and the changes over time. The main source is Eurostat, since it provides harmonised and comparable data for all member states. The start of the period (2000) is determined by the availability of Eurostat's harmonised annual sector accounts.

The EU-27 is chosen as the research setting for three reasons: it is the only group of economies for which fully harmonised sector accounts for non-financial corporations are available under a common statistical methodology; its member states share a common regulatory framework while retaining substantial cross-country variation in financing conditions, which is precisely the variation exploited by the identification strategy; and the post-2022 episode makes the region a natural setting for the question studied.

The study focuses on non-financial corporations, denoted in the European System of Accounts as sector S11. For this sector we use three main indicators from Eurostat's annual sector accounts. The first is the gross investment rate, which shows what share of the gross value added of firms is directed towards investment. The second is the gross profit share, which reflects the ability of firms to generate internal financial resources. The third is the ratio of net debt to after-tax income, which serves as an indicator of the balance sheet vulnerability of the corporate sector.

Two terminological clarifications are in order. The leverage variable used in the interaction specifications is the one-year-lagged, time-varying net debt-to-income ratio; genuinely predetermined pre-2020 leverage is used only in a separate specification. Similarly, the gross profit share is a flow measure of current internal financing capacity rather than a stock of accumulated cash or liquid assets, and references to profit 'buffers' should be read in this flow sense.

The cost of debt financing is proxied by the long-term government bond yield under the Maastricht criterion; throughout the paper, this variable is interpreted as an indicator of economy-wide financing conditions rather than as a direct measure of the borrowing cost faced by non-financial corporations. The advantages of this proxy are threefold: it is the only interest rate series harmonised across all member states for the entire period; it anchors the pricing of long-term corporate liabilities, since corporate bond and bank lending rates are typically set as spreads over the sovereign curve; and it is available at the annual frequency of the sector accounts. Its main limitation is that it also reflects sovereign credit risk, fiscal conditions and monetary arrangements, which may diverge from corporate financing conditions, particularly outside the euro area and in the newer member states; Section 4.5 therefore examines a directly measured bank lending rate as an alternative. This indicator does not directly measure the interest rates at which firms borrow. Its choice, however, is dictated by the need for a harmonised and comparable series for all EU-27 countries and for the entire period under study. The ECB indicators for the cost of bank credit to firms are available from 2003 and cover only the euro area countries, while national interest rate statistics do not permit a fully comparable analysis across countries. The Maastricht criterion yield is the only harmonised interest rate series that is available for all member states and for the entire period under study. It is therefore the appropriate basis for analysis at the EU-27 level.

This choice also has an economic rationale. In the European financial system, bank lending remains the main source of external financing for firms. Interest rates on corporate loans are usually formed on the basis of underlying market interest rate conditions, to which banks add a margin for credit risk. The yield on government bonds is one of the indicators of these underlying conditions, and changes in it are passed through to the financing conditions of firms (Albertazzi et al., 2014; Zoli, 2013; Arghyrou & Kontonikas, 2012; Committee on the Global Financial System, 2011). Recent evidence also documents linkages between sovereign and corporate debt issuance, including interactions through benchmark pricing, maturity structure and market conditions (Grundy et al., 2024). This evidence supports the use of the sovereign yield as an indicator of the broader financing environment, while not implying that it directly measures the borrowing rate paid by non-financial corporations. In the present paper it is therefore used not as an interest rate on specific corporate loans, but as an indicator of the general cost of debt financing in the respective economy. For the euro area countries, for which the ECB indicator for bank lending is available, the correlation between it and the yield used here is 0.70 ($N = 370$). In addition, Section 4.5 provides directionally consistent complementary evidence using a directly measured cost of bank credit for this subsample.

In order to distinguish the nominal from the real cost of debt, we calculate the real yield as the difference between the nominal yield and inflation measured by the harmonised index of consumer prices. The resulting variable is an ex post real yield based on realised inflation: harmonised long-horizon inflation-expectation series are not available for all twenty-seven member states over 2000–2025, so realised inflation serves as the feasible deflator, and the variable should be interpreted accordingly rather than as an ex ante real financing cost. This distinction is important, because under high inflation a nominal increase in the cost of financing may not mean the same increase in the real burden of debt. As a control variable we also use real GDP growth, which captures the general state of the economic environment.

Table 1 presents the definitions of the variables and the sources used.

Table 1. Variable definitions and sources.

Variable	Definition Under ESA 2010	Source (Eurostat)
irg	Gross investment rate of NFCs: $P51G/B1G \times 100$ (%)	nasa_10_ki
profit	Gross profit share of NFCs: $(B2G + B3G)/B1G \times 100$ (%)	nasa_10_ki
debt	Net debt-to-income ratio, after taxes: $(AF2 + AF3 + AF4, \text{liabilities} - \text{assets})/(B4N - D5) \times 100$ (%)	nasa_10_ki
yield	Long-term government bond yield, Maastricht criterion (%)	irt_lt_mcby_a
infl	HICP, all items, annual average rate of change (%)	prc_hicp_aind
ryield	Real yield: $\text{yield} - \text{infl}$ (%)	computed
growth	Real GDP growth, chain-linked volumes (%)	nama_10_gdp

The panel is unbalanced for several reasons. First, Eurostat does not publish the net debt-to-income ratio for all member states. This indicator is missing for Bulgaria, Germany, Cyprus, Romania, Croatia and the Czech Republic, and the specifications that include leverage therefore cover a smaller number of countries. Second, the data on long-term government bond yields are not available for the entire period for all countries. For Estonia, for example, the series begins in 2020, and for Bulgaria in 2003. Third, the data for 2024–2025 are largely preliminary in nature and may be revised. For this reason, Section 4.5 examines whether the results hold when these years are excluded.

Ireland is treated separately. The reason is that its national accounts are strongly influenced by the activity of multinational enterprises, which leads to unusually large values for some macroeconomic indicators. Ireland is therefore excluded from the main sample, and its inclusion is used as a robustness check on the results in Section 4.5.

3.2. Empirical Model

The empirical analysis aims to assess whether, and to what extent, a higher cost of debt financing is associated with lower investment activity by non-financial corporations. The main dependent variable is the gross investment rate of non-financial corporations. It shows what share of the sector's gross value added is directed towards investment.

The baseline specification uses a panel model with country and year fixed effects:

$$IRG_{it} = \alpha_i + \lambda_t + \beta \cdot ryield_{i,t-1} + \gamma_1 \cdot growth_{it} + \gamma_2 \cdot profit_{it} + \varepsilon_{it} \quad (1)$$

where IRG_{it} is the gross investment rate of non-financial corporations in country i in year t . The main explanatory variable is $ryield_{i,t-1}$, that is, the real long-term government bond yield lagged by one year. It is calculated as the difference between the nominal yield and inflation. The use of a one-year lag is necessary because investment decisions do

not usually respond instantaneously to changes in financial conditions. This approach also reduces the risk that current investment and current interest rate conditions are determined simultaneously.

The model includes two control variables. The first is real GDP growth, which captures the general state of the economy. When economic growth is stronger, firms usually have greater incentives to invest. The second is the gross profit share, which reflects the availability of an internal source of financing. A higher profit share may reduce the dependence of firms on external financing.

The country fixed effects α_i control for persistent differences between countries that do not change substantially over time—for example, the institutional environment, the structure of the financial system or long-term characteristics of the corporate sector. The year fixed effects λ_t capture shocks common to all countries, such as changes in monetary policy, the pandemic, the energy crisis and the general European economic climate. The estimate is thus based on within-country changes over time, once both the persistent differences between countries and the shocks common to all countries in a given year have been accounted for.

In order to test whether the effect of the real cost of debt depends on the state of corporate balance sheets, we use an extended specification with an interaction:

$$IRG_{it} = \alpha_i + \lambda_t + \beta \cdot ryield_{i,t-1} + \theta \cdot Z_{i,t-1} + \delta \cdot (ryield_{i,t-1} \times Z_{i,t-1}) + \gamma' X_{it} + \varepsilon_{it} \quad (2)$$

In this specification, $Z_{i,t-1}$ is a variable that describes the financial condition of the corporate sector or the country's membership of a particular group. The standalone term $\theta \cdot Z_{i,t-1}$ is included when Z is a time-varying quantity (lagged leverage). When Z is a time-invariant group variable, its standalone effect is absorbed by the country fixed effects, and when Z coincides with a control variable (the profit share), the standalone term is already contained in the vector X . The interaction with the real yield remains identified in all three cases. In this way we test whether investment responds more strongly to the real cost of debt under higher leverage, weaker profit buffers, or in particular groups of countries.

The variables in the interactions are centred on their sample mean. This facilitates the interpretation of the coefficient β . It shows the effect of the real yield at the average level of the respective conditioning variable.

Finally, to estimate horizon-specific conditional associations between the current real yield and investment, we use local projections following Jordà (2005):

$$IRG_{i,t+h} = \alpha_i^{(h)} + \lambda_t^{(h)} + \beta_h \cdot ryield_{it} + \gamma' X_{it} + \varepsilon_{i,t+h}, h = 0, \dots, 3 \quad (3)$$

This specification relates the investment rate at each horizon to the current real yield. The coefficients summarise horizon-specific conditional associations and should not be interpreted as identified dynamic responses or as evidence on the persistence of a causal effect.

All models are estimated with standard errors clustered at the country level. This accounts for the possibility that observations within the same country are correlated over time. In Section 4.5 we additionally test the robustness of the results using alternative samples, definitions of the variables and estimation approaches.

The approach adopted does not claim full causal identification. Interest rate conditions, investment and the macroeconomic environment may influence one another. The results are therefore interpreted as conditional empirical relationships, showing how investment activity changes at different levels of the real cost of debt, after controlling for the main macroeconomic factors and for the persistent differences between countries.

A further identification property of the two-way fixed-effects design deserves emphasis. Because the year fixed effects absorb all shocks common to the EU as a whole—including the common component of the post-2022 tightening and the surge in inflation—the coefficient on the real yield is identified from cross-country differences in national financing conditions within a given year, not from the common European rise in interest rates. The estimates therefore measure how countries with relatively higher real financing costs differ in corporate investment from countries with relatively lower ones; they cannot be read as an estimate of the aggregate investment consequences of the European tightening episode itself. The period analysis in Section 4.3 should be interpreted with the same qualification. Preliminary data checks and descriptive analyses were conducted using IBM SPSS Statistics, version 29.0.0.0 (241) (IBM Corp., Armonk, NY, USA). All econometric estimations were performed using Python, version 3.11 (Python Software Foundation, Wilmington, DE, USA).

4. Results

4.1. Descriptive Evidence: Leverage, Profit Buffers and Real Financing Costs

Table 2 presents the descriptive statistics for the main variables in the study, and Figure 1 shows the dynamics of the key indicators for the EU-27 aggregate over the period 2000–2025. Together they outline several important characteristics of European non-financial corporations that are essential for the subsequent empirical analysis.

Table 2. Descriptive statistics: EU-27 member states, 2000–2025.

Variable	N	Mean	Std. Dev.	Min.	Max.
Investment rate	681	24.54	5.81	11.61	67.08
Profit share	681	44.34	7.88	23.62	78.46
Net debt-to-income	521	353.63	304.51	−33.47	2863.64
Nominal yield	638	3.52	2.41	−0.51	22.50
Real yield	638	0.77	3.30	−18.29	21.50
GDP growth	680	2.44	3.77	−16.00	24.60
HICP inflation	681	3.02	3.65	−1.70	45.70

Notes: Unbalanced panel of EU-27 member states. Extreme values reflect Ireland and Luxembourg.

The investment rate of non-financial corporations remains relatively stable over most of the period. Its mean value is 24.5% of gross value added. Two clearer moments of decline are nevertheless observed—during the global financial crisis and after 2022. The second decline is more moderate. This is important for the central question of the paper: why the sharp rise in nominal yields after 2022 does not lead to an equally sharp contraction in corporate investment.

The gross profit share is comparatively stable. Its mean value is 44.3% of gross value added, and the fluctuations around this value are limited. This shows that over the period under study the non-financial corporations in the EU retain a relatively stable internal source of financing. This indicator is important, because higher profits may reduce the dependence of investment on external debt.

The most substantial change is observed in leverage. European non-financial corporations go through a prolonged process of deleveraging. The average ratio of net debt to income reaches around 477% in the crisis years 2009–2013, but falls to around 226% over the period 2022–2025. This decline is not an artefact of changing country composition: restricting the comparison to the balanced set of nineteen member states with data in both periods yields an even steeper fall, from around 496% to around 226% (the country set is listed in the Supplementary Materials). This means that the corporate sector enters the

most recent episode of monetary tightening with a lower debt burden than in previous periods of financial stress.

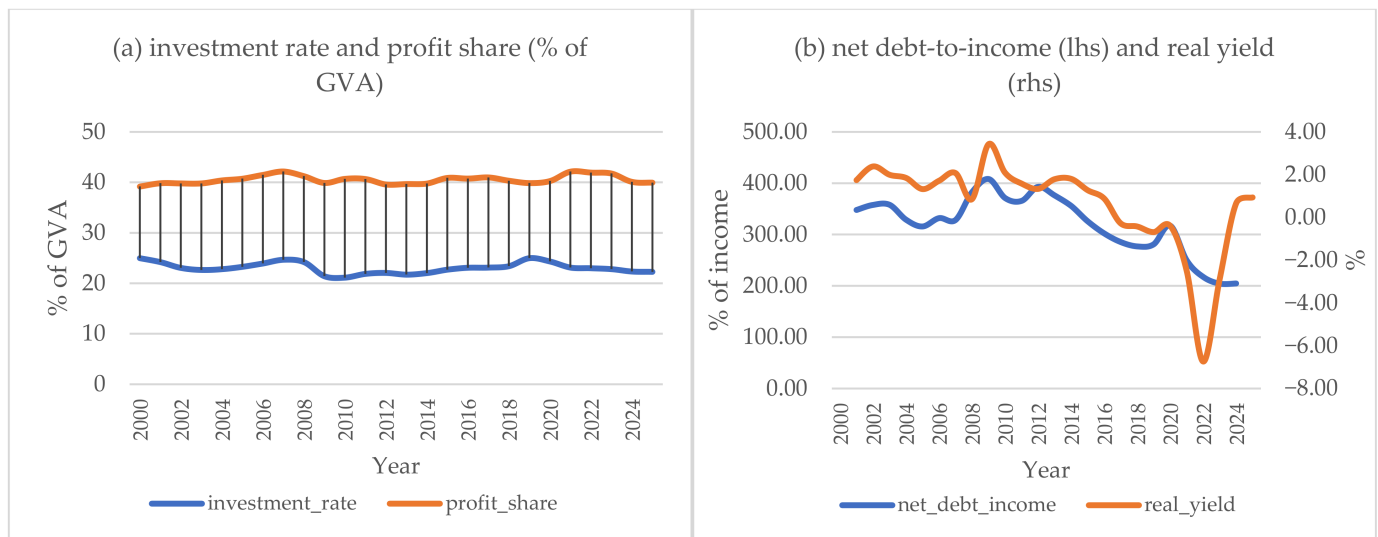


Figure 1. Dynamics of the EU-27 aggregate, 2000–2025: (a) NFC investment rate and profit share (% of GVA); (b) net debt-to-income ratio (lhs) and real yield (rhs). The vertical black lines in panel (a) indicate the annual difference between the profit share and the investment rate. The series shown are the official Eurostat EU-27 aggregates, not unweighted country means. Source: Eurostat, authors' calculations.

The dynamics of the real yield show why the nominal rise in interest rates after 2022 must be interpreted carefully. Although nominal interest rates increase, high inflation results in a negative average real yield over the period 2022–2025. This means that the real cost of debt initially does not rise to the same extent as the nominal cost. The combination of lower leverage and a negative real yield helps to explain why the investment response of firms is more moderate.

Figure 1 complements the table by showing the development of the indicators over time. The left-hand panel of the figure compares the investment rate and the profit share. It shows that investment is more sensitive to crisis episodes, while the profit share remains more stable. The right-hand panel of the figure presents the net debt-to-income ratio and the real yield. It clearly illustrates the simultaneous presence of two important processes: a decline in corporate leverage and a strong fall in the real cost of debt at the beginning of the most recent period of monetary tightening.

The descriptive statistics show that the most recent episode of rising interest rates differs from previous periods of financial stress. It occurs at a time when non-financial corporations in the EU are less indebted and hold comparatively stable profit buffers. This preliminary observation motivates the empirical tests in the following sections, where it is examined whether these balance sheet characteristics do indeed weaken the relationship between the cost of debt and corporate investment.

4.2. Baseline Estimates: Real Financing Costs and Investment

Table 3 presents the baseline estimates of the relationship between the cost of debt financing and the gross investment rate of non-financial corporations. All specifications include country and year fixed effects, and the standard errors are clustered at the country level. The main sample covers the EU-27 excluding Ireland over the period 2001–2025. Ireland is excluded from the baseline estimates because of the well-known distortions in its national accounts associated with the activity of multinational enterprises.

Table 3. Cost of debt financing and the gross investment rate of NFCs: baseline estimates.

	(1) Nominal	(2) Nominal + Controls	(3) Real	(4) Real + Debt
Nominal bond yield ($t - 1$)	−0.354 *** (0.103)	−0.049 (0.143)		
Real bond yield ($t - 1$)			−0.395 *** (0.147)	−0.322 *** (0.104)
Real yield ($t - 1$) × net debt/income ($t - 1$)				−0.041 * (0.024)
Net debt/income ($t - 1$)				0.178 (0.116)
Real GDP growth		0.539 *** (0.106)	0.516 *** (0.088)	0.449 *** (0.074)
HICP inflation		0.596 *** (0.223)		
Gross profit share		−0.106 (0.098)	−0.090 (0.099)	−0.031 (0.101)
Country FE/Year FE	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Observations	587	587	587	453
Countries	26	26	26	20
R ² (within)	−0.063	0.006	0.027	0.149

Notes: Dependent variable: NFC gross investment rate (%). Country-clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The leverage interaction in column (4) uses the lagged net debt-to-income ratio expressed in hundreds of percentage points and centred at its sample mean; the main effect of the centred ratio is reported in the same column.

In the table we distinguish between the nominal and the real cost of debt. The real yield is calculated as the difference between the long-term government bond yield under the Maastricht criterion and HICP inflation. Both the nominal and the real yield are included with a one-year lag, since investment decisions usually respond to changes in financial conditions with a delay. Column (4) adds an interaction between the real yield and initial net debt to income. This specification covers a smaller sample of 20 member states, since Eurostat does not publish the net debt-to-income indicator for all countries.

The results in Table 3 show that the relationship between the cost of debt and corporate investment depends on whether the nominal or the real cost of financing is considered. When the nominal yield enters on its own, the coefficient is negative and statistically significant. A one percentage point increase in the lagged nominal yield is associated with a fall in the investment rate of around 0.35 percentage points. At first sight this corresponds to the expectation that more expensive financing constrains investment.

This relationship weakens, however, once control variables for the macroeconomic environment are added to the model. After the inclusion of real GDP growth and inflation, the coefficient on the nominal yield shrinks and is no longer statistically significant. This shows that the nominal interest rate on its own does not capture the real burden of debt financing sufficiently well. In periods of high inflation, nominal interest rates may rise while the real value of future debt payments does not increase to the same extent. For investment decisions, therefore, what matters is not only how high the nominal interest rate is, but what the real cost of debt is once inflation has been taken into account.

This interpretation is confirmed by the specifications with the real yield. When the lagged real yield is used, the coefficient is negative, stable and statistically significant. In column (3) it is −0.395, and in the more extended specification in column (4) it remains negative and significant, at −0.322. The economic magnitude of the effect is moderate but substantial. A one-standard-deviation increase in the real yield is associated with a fall in

the investment rate of approximately 1.1–1.3 percentage points. This is about one quarter of the within-group standard deviation of the investment rate.

These results are consistent with hypothesis H1—the conditional association with corporate investment is stronger in the real-yield specification, which the restriction test shows to be an admissible representation of the data, without establishing its superiority over the unrestricted model. This qualification is particularly important for the period 2022–2025. During this period nominal yields rise sharply—from an average of 0.5% in 2020–2021 to 3.3% during the tightening period. At the same time, high inflation causes the average lagged real yield to fall to -4.0% in 2022–2025, compared with $+1.4\%$ during the period of low interest rates.

The most recent episode of monetary tightening thus appears strong in nominal terms, but in its initial phase it does not lead to the same increase in the real cost of debt. This helps to explain why the investment rate of European non-financial corporations falls only moderately—from 23.9% to 23.1% of gross value added—despite the sharpest rise in nominal interest rates of the past two decades. In other words, nominal tightening does not automatically translate into equally strong real tightening.

The baseline estimates do not show any significant amplification of the transmission through lagged leverage. The interaction between the lagged real yield and the lagged net debt-to-income ratio carries the negative sign predicted by the balance-sheet channel and is marginally significant under country-clustered inference ($p = 0.098$), but it does not survive wild cluster bootstrap inference appropriate for the small number of clusters ($p = 0.122$) and is therefore not significant at conventional levels. Hypothesis H2 therefore finds no support in this specification for the period under study as a whole.

This result does not mean that corporate balance sheets are unimportant. Rather, it shows that at the aggregate level lagged leverage does not mechanically amplify the annual response of investment to the real cost of debt. One possible explanation is the prolonged deleveraging of European non-financial corporations. As shown in the descriptive section, net debt-to-income roughly halves between the crisis years and the tightening period. This may have weakened the balance-sheet channel precisely at the moment when nominal interest rates began to rise, although the direct tests in Section 4.3 do not confirm such a mechanism.

The gross profit share is likewise not statistically significant as a direct explanatory variable in the baseline specifications. This suggests that profit buffers in themselves do not determine the level of the investment rate. It is more likely that their role manifests itself as a mitigating factor—that is, that they influence how strongly investment responds to changes in the cost of financing. This possibility is examined in more detail in the following subsection.

The explanatory power of the baseline models is comparatively modest. The within-group R^2 ranges from 0.006 to 0.149 across columns (2)–(4) of Table 3; the negative value in column (1) reflects the absence of controls in the presence of two-way fixed effects. This is to be expected with annual aggregated data, since a large part of the movement in investment is determined by common European shocks, which are captured by the year fixed effects. The negative within-group R^2 in the first column should not be interpreted on its own, since this specification does not include control variables in the presence of two-way fixed effects.

4.3. Heterogeneity of Transmission

The baseline estimates showed that a higher real cost of debt financing is associated with a lower investment rate of non-financial corporations. At the same time, no clear effect was found whereby higher lagged leverage in itself amplifies this relationship. Here,

therefore, we examine whether the response of investment is the same across all periods and countries, and whether profit buffers can mitigate it.

Table 4 presents four checks. The first compares different sub-periods. The second draws a distinction between the euro area countries and those outside it. The third examines the role of the gross profit share, and the fourth the difference between the old member states and those that acceded after 2004.

Table 4. Heterogeneity in the relationship between the real cost of debt and the NFC investment rate.

	(1) Sub-Periods	(2) Euro Area	(3) Profit Buffer	(4) Old/New MS
Real yield ($t - 1$) $\times$ 2001–2013	−0.564 *** (0.209)			
Real yield ($t - 1$) $\times$ 2014–2019	−0.423 * (0.222)			
Real yield ($t - 1$) $\times$ 2020–2025	0.099 (0.183)			
Real yield ($t - 1$) $\times$ euro area		−0.336 ** (0.152)		
Real yield ($t - 1$) $\times$ non-euro		−0.466 *** (0.163)		
Real yield ($t - 1$)			−0.447 *** (0.166)	
Real yield ($t - 1$) $\times$ profit share ($t - 1$)			0.011 (0.011)	
Real yield ($t - 1$) $\times$ EU-15				−0.634 ** (0.256)
Real yield ($t - 1$) $\times$ new MS				−0.278 (0.169)
Real GDP growth	0.468 *** (0.085)	0.524 *** (0.090)	0.495 *** (0.088)	0.487 *** (0.089)
Gross profit share	−0.085 (0.093)	−0.092 (0.099)	−0.063 (0.102)	−0.099 (0.093)
Country FE/Year FE	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Wald equality test (p -value)	0.011	0.387	–	0.022
Observations	587	587	587	587
Countries	26	26	26	26
R ² (within)	0.109	0.035	0.014	0.019

Notes: Dependent variable: NFC gross investment rate (%). Country-clustered standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. The Wald test row reports p -values for equality of the respective coefficients. Euro-area membership is defined contemporaneously, dated from the year of euro adoption. Column (3) uses the one-year-lagged profit share in both the interaction and as a control, centred at its sample mean, so that the conditioning variable is predetermined with respect to current investment.

The results show that the relationship between the real cost of debt and investment changes over time. Before 2014 it is strong and statistically significant. The coefficient is −0.564, which means that a higher real yield is associated with a lower investment rate. Over the period 2014–2019 the relationship remains negative, but is weaker. After 2020 it is no longer statistically significant.

This is an important result for the present study. It shows that the most recent episode of monetary tightening does not fully repeat the earlier periods. Despite the sharp rise in nominal interest rates after 2022, investment is more weakly associated with the real cost of debt. A possible explanation is that during this period firms are already less indebted, have stronger profitability positions, and part of their financing is supported by public programmes introduced after the pandemic. We test the balance-sheet part of this explanation directly through triple interactions between the real yield, the post-

2020 indicator and predetermined balance-sheet positions, measured as country averages over 2014–2019 (Table 5). The attenuation itself is precisely estimated: the interaction between the real yield and the post-2020 indicator equals +0.620 ($p = 0.008$), implying that the pre-2020 sensitivity of -0.53 falls essentially to zero after 2020, and the result is unchanged when the breakpoint is moved to 2022 (+0.544, $p = 0.008$). The statistically significant attenuation suggests that the change is not explained solely by imprecision. Nevertheless, the relatively short and heterogeneous post-2020 period continues to limit the precision of the period-specific estimate. The estimation sample contains 302, 150, 51 and 84 observations in 2001–2013, 2014–2019, 2020–2021 and 2022–2025, respectively. However, none of the triple interactions with predetermined leverage or predetermined profit shares are statistically significant, and the post-2020 attenuation coefficient is virtually unaffected by their inclusion. The weakening of transmission after 2020 is therefore a robust feature of the data, but it is not accounted for by the observed balance-sheet variables. The balance-sheet explanation should accordingly be read as one candidate among several—alongside pandemic-era support programmes, NextGenerationEU financing and the locking-in of low fixed rates on debt issued in 2020–2021—rather than as a finding established by the present design.

Table 5. Is the post-2020 attenuation explained by predetermined balance-sheet positions?

	(1) Post-2020	(2) Post-2022	(3) +Pre-2020 Leverage	(4) +Pre-2020 Profit Share
Real yield ($t - 1$)	−0.529 *** (0.190)	−0.504 *** (0.181)	−0.477 *** (0.113)	−0.512 *** (0.177)
Real yield $\times$ Post	0.620 *** (0.232)	0.544 *** (0.203)	0.599 *** (0.209)	0.595 *** (0.204)
Real yield $\times$ Z_pre			0.044 * (0.027)	−0.017 (0.027)
Real yield $\times$ Z_pre $\times$ Post			−0.017 (0.065)	0.005 (0.035)
Z_pre $\times$ Post			0.490 (0.320)	−0.282 ** (0.137)
Controls; Country FE; Year FE	Yes	Yes	Yes	Yes
Observations	587	587	458	587
Countries	26	26	20	26
R ² (within)	0.117	0.106	0.187	0.141

Notes: Dependent variable: gross investment rate of NFCs (%). Post = 1 for years ≥ 2020 in columns (1), (3), (4) and ≥ 2022 in column (2). Z_pre denotes the predetermined country-level average of net debt-to-income (column 3, in hundreds of percentage points) or of the gross profit share (column 4, in percentage points) over 2014–2019, centred at the sample mean; lower-order terms not shown are absorbed by the fixed effects. Controls: real GDP growth and the gross profit share. Country-clustered standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The distinction between the euro area countries and those outside it does not reveal any substantial difference. In both groups the coefficients are negative and statistically significant. For the euro area countries it is -0.336 , and for the countries outside the euro area -0.466 . Although the second value is larger in absolute terms, the Wald test shows that the difference between the two groups is not statistically significant. This means that it cannot be claimed that euro area membership in itself substantially alters the relationship between the real cost of debt and investment.

The role of profit buffers is less clear. The interaction between the real yield and the one-year-lagged gross profit share is positive but not statistically significant (+0.011, $p = 0.286$). For a corporate sector with a lagged profit share at the 25th percentile of the estimation sample (38.9% of gross value added), the marginal association of the real yield is -0.502

(95% CI: -0.893 to -0.111). At the 75th percentile (48.3% of gross value added), it is -0.395 (95% CI: -0.680 to -0.110). Because the interaction itself is not statistically significant, the difference between these two marginal associations should not be interpreted as firm evidence that higher profit shares attenuate the relationship. The full profile of the marginal associations over the observed range of the lagged profit share, with 95% confidence bands, is presented in Figure S1a in the Supplementary Materials.

Alternative specifications provide only marginal evidence of attenuation. The interaction reaches the 10% significance level when the profit share is measured contemporaneously ($+0.016$, $p = 0.072$) or by the predetermined 2014–2019 country average ($+0.020$, $p = 0.054$), but not when the one-year-lagged measure is used. The result is therefore specification-dependent, and hypothesis H3 receives at most weak, specification-dependent support. The positive sign of the interaction is nevertheless consistent with the theoretical expectation that stronger internal financing capacity may reduce firms' dependence on debt financing. However, the present estimates do not establish this mechanism conclusively.

A difference is also observed between the old and the new member states. For the EU-15 the coefficient is -0.634 and is statistically significant. For the countries that acceded after 2004, the coefficient is -0.278 and is not statistically significant. The Wald test shows that the difference between the two groups is significant.

This result may be explained by the different structure of the financial systems. In the old member states the corporate debt markets are more developed, and changes in government bond yields are more readily passed through to the financing conditions of firms. In the new member states, bank, intra-group or foreign financing may play a greater role. These sources do not always follow the movement of domestic government bonds so directly. This result should therefore be interpreted as descriptive rather than as conclusive evidence of a different transmission mechanism.

Table 4 shows that the association between the real cost of debt and corporate investment is not the same in all cases. It is stronger in the earlier years and in the old member states, but weakens after 2020. The estimates for the profit share have the expected attenuating sign, but the empirical support for this relationship remains weak and specification-dependent. The following subsection examines how the conditional association varies across horizons.

4.4. Local Projections: Horizon-Specific Conditional Associations

After the baseline estimates and the heterogeneity checks, the next step is to examine whether the conditional association between the real cost of debt and investment varies across horizons. The results so far show that a higher real cost of debt is associated with a lower investment rate, but they do not indicate whether the estimated relationship remains similar at later horizons. For this purpose, we estimate horizon-specific local projections following Jordà (2005) on the panel sample.

In each projection, the investment rate at horizons ranging from the current year to three years ahead is related to the real yield in the initial year. The model includes controls for real GDP growth and the profit share, as well as country and year fixed effects. The estimates are obtained with standard errors clustered at the country level. We use a specification in levels to preserve comparability with the baseline estimates. As Equation (3) includes the current real yield, the coefficients summarise the conditional association between the real yield in year (t) and the investment rate at each horizon ($t + h$). They do not identify an exogenous interest-rate innovation and should therefore not be interpreted as impulse responses.

Figure 2 presents the horizon-specific estimates from the parsimonious specification. At ($h = 0$), a one-percentage-point-higher current real yield is associated with an investment

rate that is 0.333 percentage points lower, and the coefficient is statistically significant at the 1% level. At ($h = 1$), the estimated association is -0.265 percentage points and is significant only at the 10% level. At horizons ($h = 2$) and ($h = 3$), the coefficients are smaller in magnitude and are not statistically significant. When lagged investment and the lagged real yield are added as additional controls, the estimates decline further and are not statistically significant even at ($h = 0$) (-0.140 , $p = 0.141$). This sensitivity reinforces the interpretation of the estimates as horizon-specific conditional associations rather than as identified responses. For completeness, the horizon-by-horizon estimates in the parsimonious specification are -0.333 (0.127) at ($h = 0$), with 613 observations; -0.265 (0.162) at ($h = 1$), with 587 observations; -0.192 (0.181) at ($h = 2$), with 561 observations; and -0.088 (0.170) at ($h = 3$), with 535 observations. The declining sample size and widening confidence intervals at longer horizons are part of the reason why the longer-horizon coefficients should not be over-interpreted. The corresponding estimates for the specification with additional lagged controls, including standard errors, confidence intervals and observation counts at all horizons, are reported in Table S1 in the Supplementary Materials.

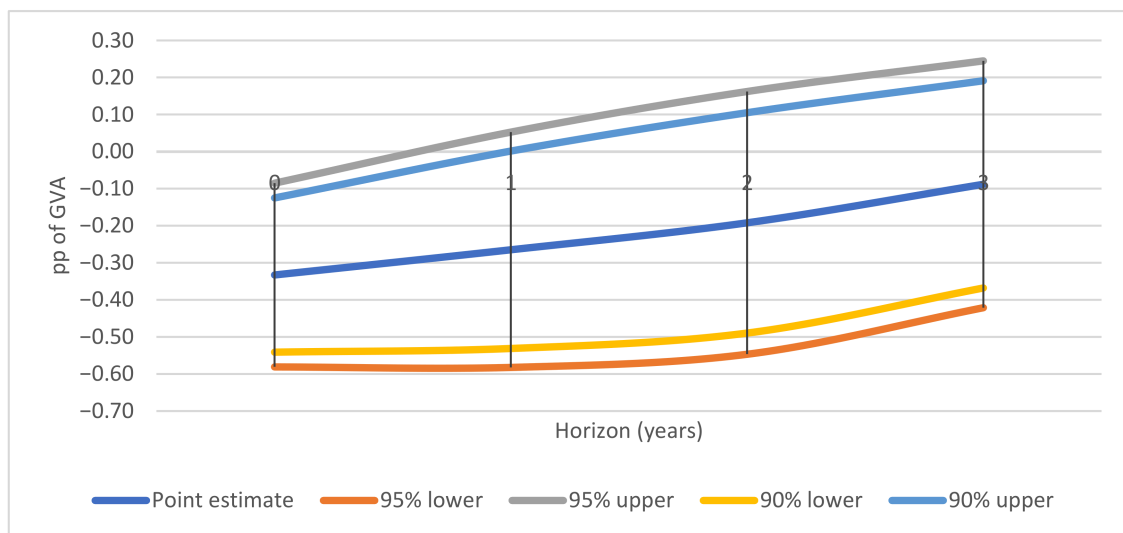


Figure 2. Horizon-specific conditional associations between the gross investment rate of NFCs and a one-percentage-point difference in the current real yield, as specified in Equation (3): local projections for horizons 0–3 years. Estimated coefficients with 90% and 95% confidence intervals based on country-clustered standard errors. Sample: EU-27 excluding Ireland, 2000–2025.

The estimates indicate that the conditional association between the real cost of debt and investment is strongest at the initial horizon. The coefficient is negative and statistically significant at ($h = 0$), but becomes smaller in magnitude and is no longer statistically distinguishable from zero at horizons ($h = 2$) and ($h = 3$). This declining pattern should not be interpreted as evidence that an identified causal effect dissipates over time. The horizon-specific associations do not establish whether the observed differences in investment reflect postponement or permanently forgone investment; addressing this question would require a cumulative-response design combined with a credible identification strategy for exogenous financing-cost shocks, which the available annual aggregate data cannot support.

These estimates complement the conclusions of the preceding subsections. The association between the real cost of debt and corporate investment is neither constant across periods nor equally strong across horizons. It is more clearly expressed at the initial horizon and becomes progressively smaller thereafter. Taken together with the results for the gross profit share and for the post-2020 period, this pattern is consistent with—but, as the direct

tests in Section 4.3 show, does not establish—the possibility that the financial position of the corporate sector moderated the observed relationship during the most recent period.

These estimates should be interpreted with caution. The data are annual and aggregated at the country-sector level, and government bond yields may themselves respond to the macroeconomic environment. The local projections therefore summarise conditional relationships at different horizons rather than causal impulse responses. They provide descriptive information about the horizon profile of the association: it is strongest at ($h = 0$) and becomes progressively smaller and less precisely estimated at the subsequent horizons.

4.5. Robustness Checks

Table 6 examines how robust the main result is to various changes in the sample, in the measurement of the variables and in the way the standard errors are calculated. The focus is on the baseline specification from Table 3, column (3), in which the investment rate is explained by the lagged real yield, real GDP growth and the profit share, with country and year fixed effects. In each check only one element is changed, in order to see whether the main result holds.

Table 6. Robustness checks on the baseline result.

Specification/Sample	Real Yield ($t - 1$)	Std. Error	N
(a) Baseline (Table 3, column 3)	−0.395 ***	(0.147)	587
(b) Including Ireland	−0.405 ***	(0.143)	611
(c) Excluding Ireland and Luxembourg	−0.381 **	(0.149)	563
(d) Excluding provisional 2024–2025	−0.436 ***	(0.162)	554
(e) Post-enlargement sample (2004–2025)	−0.427 ***	(0.162)	531
(f) Driscoll–Kraay standard errors	−0.395 ***	(0.134)	587
(g) Contemporaneous (unlagged) real yield	−0.333 ***	(0.126)	613
(h) Winsorised at 1st/99th percentile	−0.419 ***	(0.129)	587
(i) Real cost of bank credit (ECB indicator, $t - 1$), euro-area subsample	−0.313 **	(0.148)	344

Notes: The dependent variable is the NFC gross investment rate (%). Standard errors are reported in parentheses. Except for row (f), standard errors are clustered at the country level; row (f) uses Driscoll–Kraay standard errors. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$. Each row re-estimates the baseline two-way fixed-effects specification with the indicated modification; row (a) reports the unmodified baseline. Row (i) is described in Section 4.5. N denotes the number of observations.

Across the variants reported in Table 6, the coefficient remains negative and statistically significant, ranging from −0.333 to −0.436. In the additional specification with all controls lagged, it remains negative and broadly similar in magnitude (−0.265), but is not statistically significant at conventional levels ($p = 0.103$). The finding is therefore robust in direction and broadly in size, but not uniformly in statistical significance.

The inclusion of Ireland barely changes the result. This is important, since Ireland is excluded from the main sample because of the known distortions in its national accounts associated with the activity of multinational enterprises. The estimate remains almost the same when Ireland and Luxembourg are excluded simultaneously. The result therefore does not appear to be driven by individual specific economies.

The check without the preliminary observations for 2024–2025 also confirms the main conclusion. Even after these years are excluded, the coefficient remains negative and significant, and in magnitude it even strengthens slightly. This reduces the concern that the results are due to the most recent data, which may still be revised.

Restricting the sample to the period after the EU enlargement of 2004 does not alter the conclusion. The same applies when the extreme values are winsorised. The result is therefore explained neither by the early years of the sample nor by individual extreme observations. The use of Driscoll–Kraay standard errors, which are robust to spatial dependence between countries, likewise confirms the statistical significance of the effect.

The check with the current, unlagged real yield yields a slightly weaker, but again negative and significant coefficient. This shows that the relationship between the real cost of debt and investment does not depend entirely on the choice of a lagged variable, although the baseline specification with a lag remains more appropriate from the point of view of economic logic.

Two further checks have also been carried out, which are not included in the table but are important for the interpretation. When the real yield is split into its two constituent parts—the nominal yield and inflation—the coefficients have opposite signs. In the unrestricted specification, the nominal yield enters at -0.111 ($p = 0.374$) and inflation at $+0.599$ ($p = 0.013$); the formal test of the real-rate restriction—equal and opposite coefficients—does not reject the null ($z = 1.52$, $p = 0.129$), although the unrestricted model fits somewhat better (within R^2 of 0.069 against 0.027). The real-yield specification is therefore an admissible and parsimonious representation of the data rather than a demonstrably superior one, and statements that the real rather than the nominal rate is what matters should be read in this conditional sense. This supports the use of the real yield as the main variable, but the result must be interpreted with caution because of the limited statistical power of the test.

The second additional check uses the gross profit share as the dependent variable. The result shows a marginally significant positive effect of the real yield. This suggests that, when real financing is more expensive, the corporate sector may respond not only through weaker investment, but also by preserving or strengthening its internal sources of financing. This finding is supplementary and is not central to the main model, but it is useful for the discussion.

The final check in Table 6, row (i), concerns the measurement of the cost of debt itself. In the main estimates it is measured by the government bond yield, because this is the only harmonised interest rate series available for all member states and for the entire period. For the euro area countries, however, the ECB also publishes a direct indicator of interest rates on new bank loans to non-financial corporations. In this check the real yield is replaced by the real interest rate on these loans, calculated as the ECB indicator minus inflation, again with a one-year lag. The sample covers the euro area countries excluding Ireland over the period 2004–2025. The coefficient remains negative, statistically significant and close in magnitude to the baseline estimate. This is an important result, because it shows that the main finding does not depend on the choice of interest rate variable. The relationship between more expensive real financing and lower investment is confirmed when the cost of credit is measured directly. Because this alternative changes the interest rate measure, the country coverage and the sample period simultaneously, it is presented as complementary evidence on the sign and magnitude of the association rather than as a one-dimensional robustness check.

Because the number of clusters is limited (20–26 countries), conventional cluster-robust inference may be unreliable, particularly for marginal findings. We therefore re-examine the key coefficients with wild cluster bootstrap- t inference (Rademacher weights, null imposed, 999 replications). The baseline real-yield coefficient and the post-2020 attenuation are unaffected (bootstrap $p = 0.002$ in both cases). The contemporaneous profit–buffer interaction remains significant at the 10% level (bootstrap $p = 0.077$), while the leverage interaction of Table 3, column (4), is no longer significant (bootstrap $p = 0.122$), reinforcing the cautious reading of hypothesis H2.

The sensitivity of the leverage interaction to measurement is confirmed by four alternative constructions of the debt variable: winsorising at the 5th and 95th percentiles (interaction -0.042 , $p = 0.098$), trimming observations with net debt-to-income above 1000% in absolute value (-0.035 , $p = 0.129$), a within-year percentile rank (-0.247 , $p = 0.155$) and an above-median indicator (-0.211 , $p = 0.050$). The sign is uniformly negative, but

significance is fragile. Finally, the timing of the controls matters for precision: with all controls lagged one year the baseline coefficient is -0.265 ($p = 0.103$), with only lagged GDP growth it is -0.293 ($p = 0.054$), and with no controls -0.410 ($p = 0.006$), so the estimated association ranges between roughly -0.27 and -0.41 depending on the treatment of contemporaneous controls. We also note that both the investment rate and the profit share are scaled by gross value added, so part of their contemporaneous association may be mechanical; the specifications without contemporaneous controls address this concern. Finally, to address the concern that the unbalanced composition of the panel may drive the results, we re-estimate the baseline and the period-interaction specifications on the constant set of seven member states with complete data over the entire 2001–2025 window (Denmark, Finland, Germany, Italy, the Netherlands, Portugal and Sweden). The baseline association is -0.357 ($p = 0.023$) and the post-2020 attenuation $+0.798$ ($p < 0.001$), with a virtually identical result for the 2022 breakpoint ($+0.907$, $p < 0.001$), so the findings are not an artefact of changing panel composition—although the narrowness of this balanced set, seven older member states, warrants caution.

Taken together, the robustness checks show that the estimated association is stable in direction and broadly similar in magnitude across most specifications. However, when all controls are lagged, the coefficient remains negative (-0.265) but is no longer statistically significant at conventional levels ($p = 0.103$). The main result is therefore robust in sign and broadly in size, but not uniformly in statistical significance.

5. Discussion

The results of the study show that the relationship between the cost of debt financing and corporate investment in the EU-27 is more complex than the mechanical link “higher interest rates–lower investment”. For the investment behaviour of non-financial corporations, the estimated association is stronger for the real than for the nominal cost of debt. This distinction is particularly important in the period after 2022, when nominal interest rates rise sharply, but high inflation partly limits the real increase in the cost of financing.

The first main result is consistent with hypothesis H1: a higher real cost of debt financing is associated with a lower gross investment rate of non-financial corporations. This finding is consistent with the neoclassical theory of investment, according to which the cost of capital is a key determinant of the investment decision (Jorgenson, 1963; Tobin, 1969; Hayashi, 1982). When financing becomes more expensive in real terms, fewer investment projects are able to deliver the required return. The finding is also consistent with the literature on financial constraints, according to which firms may reduce or postpone investment when external financing becomes more expensive or harder to access (Fazzari et al., 1988; Hubbard, 1998; Duchin et al., 2010). In this sense, the present study provides evidence of a negative conditional association between the real cost of debt and corporate investment. Its sign and magnitude remain broadly stable across most robustness checks, although statistical significance weakens when all controls are lagged.

At the same time, the results add an important qualification to this literature. The association with investment appears more clearly in the real-yield specification than in the nominal one. The nominal yield loses statistical significance once control variables are included, while the real yield remains negative and significant. The formal restriction test does not reject treating the nominal yield and inflation as equal and opposite components of the real yield. However, this result establishes only that the real-yield specification is an admissible and parsimonious representation of the data; it does not demonstrate its superiority over the unrestricted model, which provides a somewhat better fit. The results should therefore not be interpreted as definitive evidence that only the real rather than the nominal cost of debt matters. They nevertheless indicate that, under high inflation,

nominal interest rates may overstate the real financial pressure on firms. When analysing investment in the period after 2022, it is therefore important to consider not only the direction of nominal monetary policy but also the real burden of financing.

The second result concerns the role of leverage. The theoretical expectations derived from the literature on debt overhang and the balance-sheet channel imply that higher initial leverage should amplify the negative effect of a rise in the cost of debt on investment (Myers, 1977; Bernanke & Gertler, 1989; Bernanke et al., 1999; Kiyotaki & Moore, 1997). Empirical studies likewise show that high leverage may constrain investment, particularly in firms with weaker growth opportunities or more difficult access to external financing (Lang et al., 1996; Aivazian et al., 2005; Hennessy, 2004).

In the present study, however, hypothesis H2 does not receive clear empirical support. The interaction between the real yield and lagged leverage is not statistically robust. The estimates therefore do not provide evidence that lagged leverage mechanically amplifies the association between financing costs and investment across the aggregated corporate sectors in the sample. One possible explanation is that European non-financial corporations entered the most recent episode of monetary tightening after a prolonged process of deleveraging. In the data, the ratio of net debt to income falls considerably over this period. This means that firms met the recent repricing with a lower debt burden—a factor that could in principle weaken the expected amplifying role of leverage. However, the direct tests with predetermined leverage reported in Section 4.3 do not confirm this explanation. Deleveraging should therefore be regarded as one candidate explanation among several rather than as a mechanism established by the present analysis.

This finding does not contradict the literature on debt overhang and the financial accelerator, but it indicates that the balance-sheet channel cannot be inferred directly from the aggregate leverage measure used here. Theoretical and firm-level evidence suggests that the importance of leverage may depend on the phase of the corporate financial cycle, the maturity structure of debt and firms' access to alternative sources of financing. The present aggregate results are compatible with this interpretation, but they do not establish that prior deleveraging caused the weaker post-2020 association.

The third main result concerns profit buffers. The gross profit share does not emerge as a strong independent determinant of the investment rate. The interaction between the real yield and the one-year-lagged profit share has the expected positive sign but is not statistically significant. Alternative specifications using the contemporaneous profit share and the predetermined 2014–2019 country average reach only marginal significance at the 10% level. Hypothesis H3 therefore receives at most weak, specification-dependent support. The estimates are consistent with a potential mitigating role of internal financing capacity, but they do not establish that profit buffers systematically reduce the sensitivity of investment to financing costs.

The positive sign of the interaction is theoretically consistent with the pecking-order framework, according to which firms prefer to use internally generated funds before debt and new equity (Myers, 1984; Myers & Majluf, 1984). It is also consistent with studies showing that internal cash flows and liquid reserves may be particularly valuable for financially constrained firms (Fazzari et al., 1988; Almeida et al., 2004; Denis & Sibilkov, 2010). However, the gross profit share used in the present study is a flow measure of internal financing capacity rather than a stock of accumulated cash or liquidity. It should therefore be interpreted as a potential indicator of firms' ability to generate internal resources, not as a direct measure of available financial reserves.

From a theoretical perspective, internal financing capacity may be particularly relevant during periods of monetary tightening, when external financing becomes more expensive. Firms with stronger profitability may be better positioned to preserve investment through

self-financing, whereas firms with weaker internal resources may be more exposed to changing financing conditions. The present results are compatible with this mechanism, but the weak and specification-dependent interaction estimates do not provide conclusive evidence that it operated during the post-2022 period.

The results for the different sub-periods further show that the relationship between the real cost of debt and investment changes over time. It is stronger in the period 2001–2013, weakens in 2014–2019 and is no longer statistically significant after 2020. The most recent episode of monetary tightening therefore does not reproduce the association observed in the earlier part of the sample. The post-2020 weakening may reflect several factors, including lower corporate leverage, relatively stable profit shares, high inflation, pandemic-era support programmes, NextGenerationEU financing and the locking-in of low fixed rates on debt issued during 2020–2021. However, the present design does not identify the separate contribution of these factors, and the direct balance-sheet tests do not explain the observed attenuation.

The local-projection estimates provide a complementary horizon-specific perspective. In the parsimonious specification, the negative conditional association is strongest at the initial horizon and becomes smaller and statistically insignificant at horizons of two and three years. When lagged investment and the lagged real yield are included as additional controls, the coefficients become smaller and are not statistically significant even at the initial horizon. These estimates should therefore be interpreted as descriptive conditional associations rather than as responses to an identified financing-cost shock. Although the pattern is broadly compatible with the literature on the timing of monetary-policy transmission (Bernanke & Blinder, 1992; Kashyap et al., 1993; Kashyap & Stein, 2000), it does not establish the persistence or dissipation of a causal effect. Nor can the present design determine whether the observed differences in investment reflect postponement or permanently forgone investment.

The differences between groups of countries also merit attention. The estimated association between the real cost of debt and investment is more negative and statistically significant in the old member states, while it is smaller and statistically unstable in the new member states. This may reflect differences in financial structure, in the depth of capital markets, in the role of bank lending and in the way in which government bond yields are passed through to corporate financing. The results should therefore not be interpreted as a fully uniform relationship across the EU-27, but as an average conditional association behind which lie different national financial systems.

The heterogeneity documented in the present study is consistent with recent firm-level evidence from the European Monetary Union. Canofari et al. (2025) show that corporate investment responses to monetary tightening vary across firms and countries according to leverage, financial structure and broader institutional conditions. The present results extend this discussion to harmonised sector-account data, while the aggregate design does not permit the underlying firm-level mechanisms to be identified directly.

The overall contribution of the study to the literature may be summarised along three lines. First, the conditional association with corporate investment is stronger in the real-yield specification than in the nominal-yield specification, although the formal restriction test does not establish that the former is superior to the unrestricted model. Second, the association between real financing costs and investment weakens markedly after 2020, but the direct tests do not show that the change is explained by prior deleveraging or stronger profitability. Third, profit buffers remain a theoretically plausible source of corporate resilience under monetary tightening, but the empirical evidence for their mitigating role is weak and specification-dependent.

The practical implications should be read with the associational nature of the estimates and the identification limits discussed in Section 3.2 explicitly in mind; they are offered as considerations consistent with the evidence rather than as prescriptions established by it. For firms, the stronger association obtained in the real-yield specification suggests that realistic inflation assumptions should be incorporated into investment appraisal and financing decisions, without implying that the real-yield model is demonstrably superior. The evidence that profit buffers attenuate the association is weak and specification-dependent: the interaction is not statistically significant with the one-year-lagged measure and reaches only marginal significance under two alternatives. The evidence for an amplifying role of leverage is also not robust. Recommendations that firms could insulate investment simply by deleveraging or accumulating profit buffers would therefore go beyond what the estimates support. For policy, the results caution against reading nominal interest-rate movements as equivalent real tightening, particularly under high inflation, and suggest that assessments of monetary transmission should consider corporate balance-sheet conditions among the candidate factors shaping its strength—while recognising that the present design cannot establish their causal role.

6. Conclusions

This paper examines how the cost of debt financing affects the corporate investment of non-financial corporations in the EU-27. The analysis uses a harmonised panel of annual sector accounts for the period 2000–2025 and applies panel models with fixed effects, interactions with balance sheet characteristics, and local projections. The central question is not only whether more expensive financing is associated with lower investment, but also whether this relationship depends on the leverage and profit buffers of the corporate sector.

With respect to the research hypotheses, the results are mixed but consistent. Hypothesis H1 is supported, with an important qualification: the association is stronger for the real than for the nominal cost of debt financing, the real-yield specification being an admissible and parsimonious—though not demonstrably superior—representation of the data. Hypothesis H2 finds no direct support at conventional levels of significance: the interaction carries the expected negative sign and is marginally significant ($p < 0.10$), but the effect is unstable across specifications, as documented by the alternative leverage measures reported in Section 4.5. This result must, however, be interpreted in the context of the substantial deleveraging of European non-financial corporations. The substantial deleveraging documented above is one candidate explanation for a weaker balance-sheet channel, but the direct tests in Section 4.3 do not confirm it. Hypothesis H3 receives at most weak, specification-dependent support: the attenuating role of the profit share appears at the 10% level with contemporaneous and pre-period measures, but not with the predetermined one-year-lagged measure. One of the most important results is that the relationship between the real cost of debt and investment is not constant over time.

The weaker post-2020 association may also reflect conditions on the supply side of bank credit. Recent evidence from the ECB tightening cycle shows that banks' excess reserves and liquidity positions can influence the strength with which higher policy rates are transmitted to lending conditions (Fricke et al., 2026). The present models do not identify this banking channel separately, but it provides an additional explanation for why a common nominal tightening need not produce a uniform corporate-investment response across EU countries.

These results carry three broader messages, each qualified by the associational nature of the evidence. For corporate financial management, they suggest—without establishing causally—that the financial position built up in advance of a shock may condition how strongly investment responds to financing costs; the supporting evidence is firm for the

real–nominal distinction, weaker (at the 10% level) for profit buffers, and not robust for leverage. For monetary policy, the results underline that a nominal rise in interest rates does not always amount to an equally strong real tightening, particularly in a high-inflation environment. For financial stability supervision, the corporate sector’s current resilience should not be taken as permanent: the sources of the post-2020 weakening of transmission remain only partially understood, and a renewed cycle of debt accumulation could restore the vulnerability that the balance-sheet channel implies.

The study also has several limitations. The government bond yield is a common reference point for the cost of financing, but it does not directly measure the interest rates paid by firms. These usually include an additional margin for credit risk, which may increase in periods of uncertainty. The complementary analysis using a directly measured cost of bank credit for euro-area countries provides directionally consistent evidence, although it changes the financing measure, country coverage, period and estimation sample simultaneously. The analysis uses aggregated data at the country-sector level. This ensures good comparability across countries, but it does not allow differences by size, age, industry or financial structure of individual firms to be distinguished. Ownership structure represents another potentially important source of heterogeneity that cannot be observed in the present aggregate data. Recent evidence from EMU family firms shows that family ownership can condition corporate investment responses to monetary-policy shocks (Canofari et al., 2026). This suggests that part of the cross-country and period heterogeneity documented here may conceal differences across ownership types, although this mechanism cannot be tested with sector-account data. Moreover, the results must be interpreted as conditional empirical relationships rather than as a full causal assessment. The data for the most recent years may also be revised.

Future research could extend the analysis using firm-level or distributional data, for example through sources such as CompNet or BACH. This would make it possible to test whether the weakening of the relationship between the real cost of debt and investment after 2020 is common to the entire corporate sector, or whether it conceals greater vulnerability among small, young and highly indebted firms. Another important direction is the role of the maturity structure of debt and of the fixed interest rate terms agreed during the period of cheap financing. If a substantial part of corporate debt is due to be refinanced at higher real interest rates, part of the impact of monetary tightening may manifest itself with a delay.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/jrfm19080597/s1>: README: Description of the supplementary files and reproduction procedure; File S1: EU-27 country-year panel dataset; File S2: Marginal-effects Figures S1a and S1b and local-projection estimates in Table S1; File S3: Python estimation code.

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