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This paper contains research conducted within the network “Challenges for Monetary Policy Transmission in a Changing World Network” (ChaMP). It consists of economists from the European Central Bank (ECB) and the national central banks (NCBs) of the European System of Central Banks (ESCB).

ChaMP is coordinated by a team chaired by Philipp Hartmann (ECB), and consisting of Diana Bonfim (Banco de Portugal), Margherita Bottero (Banca d'Italia), Emmanuel Dhyne (Nationale Bank van België/Banque Nationale de Belgique) and Maria T. Valderrama (Oesterreichische Nationalbank), who are supported by Gonzalo Paz-Pardo and Jean-David Sigaux (both ECB), 7 central bank advisers and 8 academic consultants.

ChaMP seeks to revisit our knowledge of monetary transmission channels in the euro area in the context of unprecedented shocks, multiple ongoing structural changes and the extension of the monetary policy toolkit over the last decade and a half as well as the recent steep inflation wave and its reversal. More information is provided on its [website](#).

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THE REAL EFFECTS OF MONETARY POLICY TRANSMISSION VIA THE FLOATING-RATE CHANNEL

by Margherita Bottero*, Michele Cascarano**, Alessandro Modica*
and Federico Maria Signoretti*

Abstract

In this paper we quantify the transmission of the 2022-23 tightening cycle to euro-area firms through the floating-rate channel, that is, via their heterogeneous exposure to the repricing of outstanding bank debt. As firms' exposure to floating-rate loans is not exogenous, we instrument it with the random exposure of their lenders to the inflow of retail deposits ensuing from the ECB's Asset Purchase Programme, which affected intermediaries' propensity to lend at floating rates. According to our estimates, an increase of 450 basis points in the 3-month Euribor rate (as observed in 2022-23) would have reduced the investment rate of companies with a high share of floating-rate debt (in or above the 75th percentile) by 14.8 percentage points more than for those with fixed-rate debt only. This effect compares with an average investment rate in the sample of 14 per cent.

JEL Classification: E52, E44, G32, D22.

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1 Introduction¹

How does the share of loans at floating rate impact the transmission of monetary policy? The historically steep and speedy 2022-23 euro area tightening cycle has clearly highlighted that “not all debt is born alike” (Jungherr et al., 2024), with the cost on outstanding credit rising much faster in countries with a larger share of variable rate loans, complicating the reading of aggregate data and contributing to blurring the reliability of forecasting exercises. Looking ahead, this question remains relevant for the ongoing easing cycle, with floating rate debt transmitting the accommodative impulse more rapidly. Analyzing the breadth of the “floating rate channel” and its implications for the speed of monetary policy transmission is particularly relevant in a multi-country setting such as the Euro Area, where a large heterogeneity in the composition of bank debt is not only likely but well-known, and, if overlooked, may result in a miscalibration in the conduit of monetary policy.

In this paper we set out to empirically estimate how the share of floating rate bank loans influences the transmission of monetary policy to investment. We broaden the picture to include, then, its effects on employment choices, sales and operating profits of firms. We work on firms from the five largest euro area countries (DE, IT, ES, BE and NL) excluding France, for which we cannot access some key data for identification of the effects. The floating rate channel of monetary policy transmission is fundamentally different from the bank lending channel as it operates through the stock of loan debt that is outstanding, rather than via new loans (see Appendix A for a stylized explanation). This channel is still somewhat relatively understudied (Ippolito et al., 2018; Cloyne et al., 2019; Flodén et al., 2020; Core et al., 2024), owing to the relative scarcity of granular data on firm outstanding loans’ interest rate fixation period, as well as to the endogeneity between a firm’s loan structure and its real

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activity outcomes, which challenges the causal identification of the effect. Moreover, it is not unlikely that, in the presence of gradual movements in the monetary policy rates, the activation of this channel is only moderate, compared to the bank lending channel, and thus its effects are difficult to empirically estimate.

Our paper addresses all the constraints above. First, we exploit granular, loan-level data on firms' share of floating and fixed rate loans matched with their investment choices and other relevant balance sheet characteristics. Second, we isolate the causal effect of the share of floating debt in the transmission of monetary policy by resorting to an innovative instrumental variable (IV) approach. Third, we study the potency of the channel during the 2022-23 tightening cycle, which was unprecedented in size and speed, allowing us to capture the full effect of the mechanism under study.

Our IV approach revolves around the simple idea that *exogenous* (as good as random) variations in the composition of a firm's bank debt (fixed/floating), which are needed to causally identify the floating rate channel, should stem from the firm *lenders'* decisions. Building on this intuition, we searched for shocks that have the potential to induce lenders to tilt their credit supply towards a certain type of loans (fixed or floating). One such shock turns out to be the banks' exposure to the inflow of retail deposits forced on them by the creation of excess reserves via the ECB Asset Purchase Program.

The logic is as follows. When the ECB purchases assets from non-bank private investors, reserves accumulate at banks matched by an increase in retail deposits. Since overnight household deposits are a stable, broadly fixed-rate liability (owing to the so-called "deposit franchise", (Drechsler et al., 2017)) banks rebalanced their loan portfolios towards fixed-rate lending to match the duration and rate-sensitivity of their liabilities. As a result, firms whose lenders received larger APP-induced deposit inflows ended up with a higher share of fixed-rate debt, independently of their own investment and financing choices. We document this mechanism formally, and present the supporting visual and econometric evidence, in Section 5. In the same section we address a number of threats to identification, including

the potential confounding role of the aggregate demand channel and the direct credit supply effect of reserves.

Putting all this together, we argue that a firm’s share of floating rate can be instrumented with the unexpected deposit inflows of its lenders, weighted by the share granted to it by each bank before the tightening started. This, we argue, is plausibly exogenous to a firm’s investment, employment, and production choices during the hiking cycle. To isolate the unexpected component in deposit inflows, we build on the notion of non-borrowed reserves as in [Altavilla et al. \(2025\)](#). That is, we compute for each bank the inflow of central banks reserves in excess of those required and those generated by TLTROs loans. This, we claim, measures an exogenous creation of retail deposits in a banks’ balance sheet.

In [Section 4](#) we carefully show the validity and the relevance of our instrument and describe the two-stage least squares (TSLS) approach in which we nest it. In practice, we will first regress a firm’s share of floating rate loans on the exogenously induced deposits at its lenders (proxied by their non borrowed reserves). Then we use the predicted dependent variable as the explanatory variable in an OLS regression on investment, employment, sales, etc. We enrich the analysis by inspecting possible heterogeneities of the effect by relevant firm characteristics, most prominently sector of activity and firm size.

The first-stage results indicate a consistently negative and statistically significant relation between the exogenous influx of deposits with a firm’s lenders and its share of floating rate loans. This relation, which is stable once controlling for firm and time fixed effects, as well as for relevant firm time-varying characteristics, establishes that intermediaries reacted to the inflow of stable liabilities by tilting their corporate portfolio to equally stable-return-yielding assets. Further, it captures the exogenous variation in firm debt composition that we exploit in the second stage.

IV results highlight significant insights. Baseline estimates indicate that exogenous increases in a firm’s reliance on variable-rate borrowing generally dampen investment. Specifically, for firms whose debt structure was shifted by their banks’ balance sheet adjustments,

a 1 percentage point rise in the share of floating-rate debt (sample average: 43 per cent) is associated with a 0.42 percentage point reduction in investment growth (sample average: 12 per cent). Consistently with the floating rate channel, about two-fifths of this negative impact is triggered by monetary policy, and materializes via the interaction between changes in the reference rate and the share of floating-rate debt. Point estimates reveal that the increase of 450 basis points in the 3-month Euribor rate (as observed during the monetary tightening observed during the 2022-23 period) implied an additional 14.8 percentage point reduction in the investment rate (whose average value on the sample is 14%) for firms with a high share of floating-rate debt (at the 75th percentile, corresponding to a debt share of 97%) compared to firms with exclusively fixed-rate debt (accounting for approximately two-fifths of the sample).

While the interpretation of the negative effect of the interaction between the floating-rate loan share and the policy rate is intuitive in the context of the floating rate channel, the remaining direct, negative effect of the share of floating-rate credit on investment is less intuitive². Likely, it may stem from the higher interest-rate risk connected to the high repricing frequency of these loans, which in turn lowers expected profitability and thus the propensity to invest.³

Having established the baseline effect, we next explore whether the floating rate channel operates heterogeneously across sectors: we document that the negative interaction between floating rate debt and changes in the reference rate emerges in a widespread way for firms in manufacturing, services and construction. The direct, residual effect of floating-rate exposures on investment is instead found only for firms in the service sector.

Additional results explore if the floating rate channel operates differently for smaller vs larger firms, and if its effects also extends beyond investments. The rationale for these exercises is to test whether the channel operates more strongly for companies that may have

²The negative direct effect of the floating-rate share on investment, operating independently of the monetary policy stance, is robust across specifications and instrument definitions, ruling out that it is driven by measurement artefacts. A structural decomposition of this effect is left to future research.

³See (Uppal, 2024) for a discussion of how such risk feeds back onto banks' leverage.

difficulties in accessing alternative forms of finance, e.g. smaller firms, and if it extends to other margins of production, such as employment, sales and total assets. The estimates indicate that the effect on investment is broadly comparable between firms of different size, although it disappears for larger firms in the specification where we assess the impact of floating rate channel in the context of firms' overall debt. When looking at firms' activity more broadly, however, the channel is more severe for smaller firms. In particular, smaller companies reduce also employment, sales and profits in a significant way. Further, their scale down their assets, indicating that they may be selling some property to meet the increased debt burden.

What are the implications of the floating rate channel for monetary policy? Our results suggest that this channel is indeed active also in the euro area, and should be accounted for in gauging the intensity of a monetary restriction. While on average the effect is documented across sectors of activity, the analysis highlights important heterogeneities in who bears the brunt of the impact, with smaller firms suffering significantly more from the unanticipated increase in debt servicing costs.

An ancillary result of our paper is that it uncovers, also for the euro area, the side effect that large central banks' purchases have on intermediaries' balance sheets (see section 2 for a discussion of the available evidence for the US). We document that, in the period under study, the creation of deposits in banks' liabilities tilted their credit supply, as intermediaries rebalanced their asset side to match the longer duration and fixed-rate remuneration of their liabilities. The reallocation of credit supply towards fixed-rate loans allowed some firms to enter the tightening cycle more insulated from the effect of the rate hikes than others, hampering the transmission to certain economies and leaving other ones more exposed.

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 describes our data. Section 4 presents our methodology and while Section 5 discusses the IV strategy. Section 6 reports the main results, the robustness and heterogeneity analyses, and Section 7 concludes with policy implications.

2 Literature Review

Our paper speaks to at least three strands of the literature.

First, we contribute to the studies that analyze the heterogeneity of transmission via the composition of firms' bank debt. [Ippolito et al. \(2018\)](#) studies monetary policy transmission via the floating rate channel for US listed firms. The authors document a strong amplification effect of monetary policy tightening via the repricing of outstanding floating rate debt, which leads to a depletion of firms' cash buffers and a decrease in investment. [Gurkaynak et al. \(2022\)](#) studies if monetary policy transmission is stronger for firms more indebted at floating rate also via affecting (lowering) stock markets' perception of the value of the firm. Indeed, the authors affirm that stock price reaction to monetary policy surprise is stronger for firms more indebted at floating rate, especially when the surprise is about the future path of policy rates. This negative effect is found to translate in lower investment, assets and net worth in the quarters following the shock. Consistent with our work, both papers point to the existence of a significant floating rate channel, but are constrained by data limitations in the precise quantification of the share of floating rate loans⁴ and provide a limited picture of the overall real effects on firms' behavior and the heterogeneities behind average results.

Closer to ours is the paper by [Core et al. \(2024\)](#), who study how monetary policy transmits via the floating rate channel to the pricing decisions of firms. The authors study euro area firms, matching loan-level data with price data and find that in the context of the 2022-23 tightening cycle, firms more indebted at floating rate decreased prices by less, in an effort to make up for the increased debt burden. This was especially the case the larger the market power they enjoyed. Consistent with them, we find that larger firms, thus those likely to have more market power, did not suffer a negative impact on employment and turnover.

The second literature we relate to is functional to justify our instrumental variable ap-

⁴In the US, differently from the euro area, virtually all bank debt is at variable rate and at short maturity, which justifies considering the whole item "bank loans" as floating rate loans. The situation is different in the euro area, where firms have different mixes of floating and fixed rate debt, depending on country specificities and sector of activity.

proach, which rests on the findings on the impact of central bank's reserves on banks' asset and liability management. There is general consensus that central bank support stimulates banks to increase maturity transformation, i.e., to use more short-term and less long-term debt to finance their long-term assets (Farhi and Tirole (2009) and Mink (2011)), considering that short-term liquidity, if coming from a central bank, is sufficiently stable to allow for a sustained maturity-mismatch. However, APP is not comparable to liquidity support measures, and, as a result, produces *retail private sector deposits* at the banks. This tilts the floating/fixed rate composition of banks' liabilities towards fixed-rate ones, as retail deposits, especially from households, are sticky with the banks they are with and are remunerated at a broadly fixed rate not linked to the policy rate (Drechsler et al. (2017)). Kirti (2020) finds that banks' funding structure is an important determinant of the type of loan rate offered to firms. Banks that have more floating (fixed) rate liabilities choose to lend more in floating (fixed) rates and hold more floating rate securities.

To our knowledge, we are the first to study how the side-effect of the creation of retail deposits by the APP purchases tilts the supply of credit between fixed and floating rate loans. A growing literature has however investigated the broader issue of QE and lending. Acharya et al. (2023) and Acharya and Rajan (2023) both move from the consideration that the Fed QE resulted in an increase in banks' demandable deposits and credit lines. In the first work, the authors explore the financial stability consideration of these implications, arguing that such increase leaves banks more exposed to bank runs when reserves are drained from the system, as banks cannot operate a proportionate reduction in the deposit claims. In the second work, the focus is more on lending, with the authors concluding that the term rate compression operated by QE does not prompt a lengthening in banks' liabilities, and from there an increase in long-term loans (as implied by the rebalancing channel). Compared to these works, we find that the increase in banks' deposits following the APP implies a stabilization of the yields of banks' liability structures, because of the franchise value of deposits, rather than a shortening or an increased volatility. This stabilization, in turn, has

prompted a reshuffling of the interest rate determination period in the asset side, moving from floating to fixed-rate loans.

Other works look beyond credit lines, and find a positive relation between reserves injected by the Fed QE and lending, such as [Kandrac and Schlusche \(2021\)](#) and [Rodnyansky and Darmouni \(2017\)](#). For the euro area, [Altavilla et al. \(2025\)](#) find that in the euro area an increase in central bank reserves is associated with an expansion in credit supply via an increase in banks' liquidity. This result follows however only from increases in “non-borrowed” reserves, that is, reserves other than those created by the intermediary borrowing from the central bank.

Differently from these papers, [Diamond et al. \(2024\)](#) investigates directly the relationship between central bank reserves and lending in a structural model. They argue that the injection of reserves uses up balance sheet space increasing banks' marginal cost of lending. As a consequence, the price of a loan is adjusted upward, the more so the more constrained the bank is, and loan volumes decline, in particular for non-financial corporations, that have a more elastic demand compared to households. In our paper, the direct effect of reserves on loans is a confounder of our instrument, so we control for this in various ways (see [Section 4](#)). At the same time, there are reasons to think that their mechanism may not have been in place in the euro area, where the APP was accompanied by negative policy rate and by the targeted longer-term operations (TLTROs), which ensured the smooth activation of the bank lending channel.

Finally, we connect broadly to the corporate finance literature studying how changes in firms' cost of capital influence investments (see [Chirinko \(1993\)](#) for a review). From this perspective, the exogenous variation in the composition of firms' debt which we study can be seen also as a variation in its cost. The breadth of this variation in the economy is relatively rare in a literature where finding such shifts is difficult ([Zwick and Mahon \(2017\)](#); [Ohrn \(2018\)](#); [Hartley et al. \(2025\)](#) among others).

3 Data

We work with a yearly panel dataset for a sample of euro area firms over the period 2018:12-2023:12, that links information on their investment, employment, sales and profits with the average exposure of their lenders to the inflow of APP-induced deposits. Information is drawn from three main sources, which we discuss in turn below. Overall, we work with about 3 mln observations for 700K firms from the largest five euro area countries, except France, for which we miss the key information on central banks' reserves (DE, IT, ES, NL, BE).

Firms' variables. Firms' variables are drawn from Orbis. Orbis collects balance sheet information for euro area non-financial corporations at a yearly frequency, alongside other relevant information such as the firm's location and sector of activity. Our main second-stage dependent variable, investment, is drawn from this source and computed as the yearly growth rate of fixed assets. We also look at the additional dependent variables: employment (head count), sales and operating profits (EBIT), all computed as growth rates. In addition, we use the following other variables as controls: leverage (total debt over total assets), profits over total assets, cash over total assets, size (measured as log assets), sector of activity and number of lenders. Our preferred scaling is by bank loans, but in the Appendix we present the results obtained by scaling with total debt. All variables are described in Table 1, panel (a).

Credit variables. We draw information on firms' bank debt from the euro area loan-level dataset AnaCredit. We retrieve yearly information on firms' total outstanding loans (amounts) and average interest rate.⁵ Loans are then split between floating and fixed-rate loans depending on the period of fixation of interest rate and on loan maturity. Floating rates loans are loans whose rate is fixed for at most one year; conversely, loans with rate

⁵The data are originally recorded at the monthly frequency, but we look at end-of-year figures, in view of the merge with yearly Orbis data. The interest rate is computed as the interest rate paid over the outstanding amount over the corresponding year.

fixation period above one year are considered fixed rate. In addition to considering a firm's exposure to variable rate loans defined by their interest rate fixation period, we also categorize as variable (fixed) rate loans with residual maturity below (above) 1 year. We do this to capture the part of the floating rate channel's impact that arises from roll-over risk, i.e. the fact that firms may have to roll-over outstanding loans at a rate higher than the original one. Similarly we also include among variable rate category all the loans with a maturity shorter than 1 year. For each type of loan rate duration, beyond looking at total credit, we further isolate term loans and credit lines. We then work with four dependent variables, that is, the share of total credit at variable rate and the share of term credit and credit lines at variable rates, each scaled by two measures of firms' indebtedness, total bank debt and total debt. Variables are described in Table 1, panel (b).

Bank variables. Bank information is drawn from the euro area individual Bank Balance Sheet Item (iBSI) dataset. The key variables of interest are banks' overnight retail deposits (from the households and from non-financial corporations) and its central bank reserves. These are defined as the end-of-month deposits with the ECB, net of the banks' reserves requirements. To net non-borrowed reserves from borrowed ones, that generated from a bank's intentional recourse to TLTRO facilities, we measure the latter as liabilities vis-a-vis the Eurosystem.⁶ We also collect information on banks' total assets as well as data on loans to firms and to households for house purchase.

Monetary and macroeconomic variables. We measure monetary policy impulses using the 3-month Euribor rate (computed as yearly averages), as it is the typical benchmark for pricing firms' variable loans. During the tightening cycle, this rate closely tracked changes in the policy rate, giving us confidence that it effectively captures the original monetary impulse.

⁶Reserve requirements are calculated as the 0.001 of previous month deposits with the private, non financial sector.

Table 1: Summary statistics (Panel A: firm-level variables; Panel B: financial structure and rate exposure)

Statistic	Investment	Employment	Cost of empl.	Cash flow	Cash	EBIT	Sales	Total assets	Current assets
Panel A: Investment and firm characteristics									
N	3,108,446	2,451,256	1,984,734	2,245,536	3,083,330	2,396,861	2,061,688	3,108,446	3,108,399
Mean	0.14	0.05	0.11	0.02	1.58	-0.05	0.12	0.08	0.13
p25	-0.14	-0.04	-0.06	-0.45	-0.36	-0.66	-0.09	-0.05	-0.09
p50	-0.03	0.00	0.05	-0.01	0.08	-0.06	0.05	0.03	0.06
p75	0.11	0.09	0.20	0.44	0.89	0.52	0.24	0.17	0.25
SD	0.68	0.27	0.40	1.79	5.23	2.41	0.43	0.25	0.42
Min	-0.62	-0.50	-0.63	-5.94	-0.95	-8.12	-0.69	-0.36	-0.58
Max	3.29	1.00	1.67	6.01	28.28	7.96	1.77	0.96	1.77
Statistic	Debt/Assets	Cash/Assets	Firm size	Number of lenders	Var. loans/Tot. loans	Var. term/Tot. loans	Var. loans/Tot. debt	Var. term/Tot. debt	
Panel B: Financial structure and floating-rate exposure									
N	2,734,024	3,083,330	3,108,441	3,108,446	3,084,561	3,084,561	1,917,973	1,917,924	
Mean	0.24	0.15	7.26	1.70	0.43	0.32	0.25	0.21	
p25	0.00	0.02	6.24	1.00	0.00	0.00	0.00	0.00	
p50	0.17	0.09	7.12	1.00	0.33	0.02	0.07	0.00	
p75	0.38	0.22	8.14	2.00	0.97	0.71	0.46	0.34	
SD	0.82	0.17	1.50	1.30	0.43	0.40	0.33	0.31	
Min	-2.25	-9.68	-6.91	1.00	0.00	0.00	0.00	0.00	
Max	970.39	3.76	20.50	220.00	1.00	1.00	1.00	1.00	

4 Empirical strategy

The causal relationship we are interested in estimating is the following:

$$Inv_{f,y} = \beta_1 FloatLoans_{f,y-1} + \beta_2 MP_{y-1} + \beta_3 FloatLoans_{f,y-1} * MP_{y-1} + X_{f,y-1} + e_{f,y} \quad (1)$$

That is, we seek to estimate how the share of floating rate loans of firms ($FloatLoans_{f,y-1}$) affects the transmission of monetary policy MP_{y-1} to investment growth ($Inv_{f,y}$).

The main challenge in identifying equation 1 lies in the (possibly unobservable) endogeneity that shapes both a firm's investment decisions (or employment or production choices) and its bank debt composition. Firms with a higher share of floating rate loans may systematically face better or worse investment opportunities, depending, for instance, on their production model or the characteristics of their sector. In addition, unobserved factors could

simultaneously influence both a firm's debt structure and its investment behavior. As a result, simply regressing investments on the observed share of floating loans is unlikely to capture the causal impact of interest rate fixation, even in a panel framework with fixed effects to account for time-invariant factors.

To address this issue, we adopt an instrumental variable (IV) approach, relying on an instrument that affects a firm's share of floating rate debt (relevance) but has no direct or indirect impact on firm investments or other real results, except through its effect on debt composition (exclusion restriction). We construct this instrument measuring the unexpected inflow of retail deposits at the bank level caused by the ECB Asset Purchase Program (APP). The rationale is as follows. As the central bank was buying financial assets from the private sector during the APP, private banks had to simultaneously swap assets for reserves with the ECB and assets for overnight deposits with the private sector. This resulted in a large increase in deposits held with banks (as shown in Figure 2), which was also heterogeneous across intermediaries, in ways that reflected the genuinely exogenous ECB's purchase schedule.⁷

Overnight deposits, especially from households, are a stable source of funding for banks, on which they pay, in virtue of the relative sluggish elasticity of depositors to changes in monetary policy rates, a relatively predictable remuneration, not very responsive to changes in the risk-free policy rate.⁸ In response to this large, unexpected increase in stable, fixed-rate liabilities, banks adjusted the composition of their loan book towards fixed rate, in an effort to match the variability of interests paid (on deposits) and received (on loans; see Drechsler et al. (2017)). Indeed, Figure 3 shows the positive correlation between the influx of household deposits experienced at the single bank level and the share of fixed-rate loans until 2021, after which the tightening cycle kicks in and volumes drop.

⁷Banks, owing to the negative interest rate environment, paid a substantial rate on excess reserves, which prompted their attempt to dispose of them. However, the creation of deposits initially associated with the purchase was stuck with the bank that has the purchased asset in custody.

⁸Before the negative interest rate period (2014:06), the beta of overnight deposits -i.e. the ratio between cumulated changes in policy rate and those in their remuneration - was 0.4 in the euro area. In the 2021-23 tightening cycle it dropped to less than 0.1.

In practice, however, deposits move around for a variety of reasons, not necessarily exogenous to a banks' choices or linked to the APP. For this reason we cannot instrument a firms' share of floating debt directly with the inflows of retail deposits at the bank level. We also cannot look at the inflow of Central Bank's reserves as these are in part determined by banks' funding choices, e.g. in the case of those generated by the recourse to TLTRO funds. Thus, to capture the part deposit inflows exogenously generated by the APP, we move from [Altavilla et al. \(2025\)](#) concept of "non-borrowed" reserves, which are defined as that part of reserves that are created exogenously from banks' funding choices. We argue that the inflow of non-borrowed reserves generated by the ECB's purchase program⁹ are a good proxy for the unexpected retail deposit inflows at the bank level. As such, in virtue of the mechanism described above, they tilt banks' funding structure in a way that prompts a re-composition of the asset-side towards fixed-rate loans. In the next subsections, we will take the reasoning above to the data, to establish more robustly the link between non-borrowed reserves, deposit inflow and new fixed-rate loans.

Thus, through variation in the inflow of retail deposits generated by that of non-borrowed reserves connected with ECB purchases, intermediaries have been heterogeneously prompted to adjust their loan supply toward fixed-rate loans, in a way which we argue is idiosyncratic to both banks' lending schedule and firms' investments. To improve on the exogeneity (see next subsection, Exclusion restriction), we further refine the instrument by defining it as the unexplained component $\widehat{u_{b,y}}$ of banks' non-borrower reserves - that is, central bank's reserves net of those generated by TLTRO borrowing $TLTRO_{b,y}$ - after controlling for year and bank-specific fixed effects.

$$Reserves_{b,y} = \beta_1 TLTRO_{b,y} + FE_b + FE_y + u_{b,y} \quad (2)$$

We nest this variable in a shift-share instrument (or Bartik instrument from [Bartik](#)

⁹Note that we measure this notion in a slightly different way from the original definition owing to data access limitation.

(1991)). More precisely, we exploit multiple bank-firm relations and aggregate at the firm level the $\widehat{u}_{b,y}$ estimated for each of its lenders, weighted by the firm’s share of loans from that lender at an earlier point in time. Our instrument $Instr_{f,y}$ for a firm’s share of floating-rate loans in year y is then given by

$$Instr_{f,y} = \sum_{b \in B} Shares_{f,b,y_0} \times Shock_{b,y-1} \quad (3)$$

$$Shock_{b,y-1} = \widehat{u}_{b,y-1} \quad (4)$$

$$Shares_{f,b,y_0} = \frac{Loans_{f,b,0}}{Loans_{f,0}} \quad (5)$$

where $\sum_{b \in B} Shock_{b,y-1}$ is the sum of (our proxy for) non-borrowed reserves among lenders $b \in B$ of firm f in $y - 1$ (“shock” part of the Bartik instrument), weighted by the share of loans granted by each lender b to firm f in the year y_0 (“share” part of the instrument). As standard, we set the weight in first date available $y_0 = 2019 : 12$ to minimize endogeneity concerns between the weights and the investment variable used in the second stage (see [Greenstone et al. \(2020\)](#) and [Goldsmith-Pinkham et al. \(2020\)](#))¹⁰.

Before discussing the exclusion restriction and instrument relevance in the next subsections, we outline our two-stage least squares (2SLS) estimation strategy.

Recall that, to estimate the floating rate channel, the second stage includes two endogenous regressors in the equation for $Inv_{f,y}$: i) the share of variable-rate loans of firm f in year y ($Float_{f,y}$), and ii) its interaction with the monetary policy stance $Float_{f,y} \times MP_{y-1}$. That is, in the OLS version,

$$Inv_{f,y} = \beta_0 + \beta_1 Float_{f,y-1} + \beta_2 Float_{f,y-1} \times MP_{y-1} + FirmChar_{f,y-1} + FE_f + FE_y + e_{f,y} \quad (6)$$

where $FirmChar_{f,y-1}$ are lagged firm-level controls, and FE_f , FE_y are firm and year

¹⁰We choose December 2019 to account for possible reporting errors of credit data in 2018, when the AnaCredit database was reasonably new. The dataset was operational as of September 2018.

fixed effects (which absorb $*MP_{y-1}$ when not interacted).

We therefore require two instruments to be estimated in the first stage: the Bartik instrument and its interaction with monetary policy. Formally, the full system consists of two first-stage regressions:

$$\begin{aligned} Float_{f,y} = & \pi_{10} + \pi_{11}Instr_{f,y} + \pi_{12}(Instr_{f,y} \times MP_y) \\ & + FirmChar_{f,y} + FE_f + FE_y + u_{1,f,y} \end{aligned} \quad (7)$$

$$\begin{aligned} Float_{f,y} \times MP_y = & \pi_{20} + \pi_{21}Instr_{f,y} + \pi_{22}(Instr_{f,y} \times MP_y) \\ & + FirmChar_{f,y} + FE_f + FE_y + u_{2,f,y} \end{aligned} \quad (8)$$

The predicted values from this first-stage are then used in the second stage:

$$\begin{aligned} Inv_{f,y} = & \beta_0 + \beta_1 \widehat{Float}_{f,y-1} + \beta_2 \widehat{Float}_{f,y-1} \times MP_{y-1} \\ & + FirmChar_{f,y-1} + FE_f + FE_y + e_{f,y} \end{aligned} \quad (9)$$

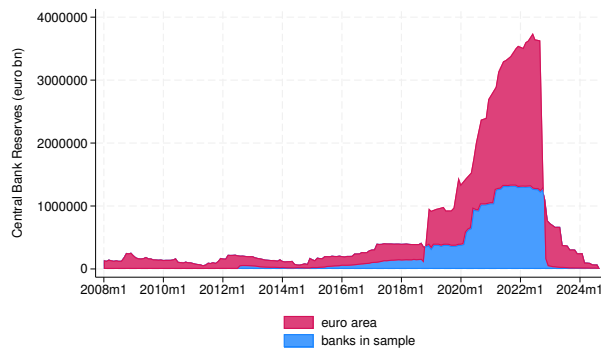
This setup allows us to estimate both the direct effect of floating-rate borrowing on investment and its amplification via the monetary policy stance—that is, the floating rate channel of transmission.

5 IV discussion

5.1 Relevance at bank level

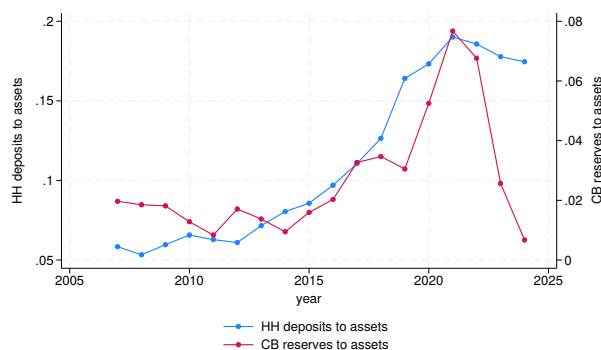
When the central bank buys financial assets from the private sector, it exchanges reserves with the bank holding the asset in custody. The intermediary simultaneously credits deposits to the selling saver's account. As a result, the bank's balance sheet grows symmetrically on the asset side with reserves and on the liability side with deposits (Figures 1 and 2).

Figure 1: Evolution of Central Bank's Reserves over time



Notes: the chart displays the value of excess reserves at the euro area level; for banks in the sample this value, which is not publicly available, is proxied by that on deposits with the central bank net of the required reserves.

Figure 2: Evolution of Central Bank's Reserves and Household deposits over time

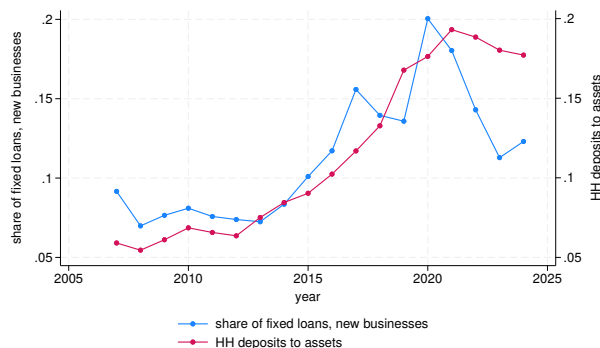


Notes: The chart displays the evolution of excess reserves and overnight deposits to HH, scaled by assets, for banks in the sample.

This shift in the composition of banks' liability side towards fixed-rate, stable-yielding

liabilities pushes intermediaries to adjust the duration of their asset side, i.e. to offer more fixed-rate loans (Drechsler et al. (2017)). This adjustment, visually displayed in Figure 3, creates the mechanism underscoring the relevance of our instrument.

Figure 3: Evolution of Household deposits and share of fixed rate loans over time



Notes: the chart displays the evolution of overnight deposits from HHs and new businesses with interest fixation period above one year, scaled by assets, for banks in the sample.

In this section we formalize such anecdotal evidence. We proceed in three steps. First, we regress banks' share of overall overnight deposits on our measure of banks' exposure to APP-induced deposit inflows (that is, the refined measure of non borrowed reserves ($\widehat{u}_{b,y}$ described in 2), scaled by assets. This step ensures that we are capturing a meaningful shift in banks' liability duration. Results, displayed in Table 2, highlight a positive and statistically significant relation. This supports the claim that the residuals $\widehat{u}_{b,y}$ proxy the exogenous inflow of households' deposits which will later trigger the re-composition of supply toward fixed-rate assets (see Section 1). To strengthen the causality claim, we progressively saturate this regression with year fixed effects (column 2) and year and bank fixed effects (column 3). In all cases, the relation is positive and statistically significant.

Next, we test the relationship between overnight deposits and the flow of new fixed-rate loans (as a share of the flow of new total loans) at the bank level.¹¹ Results are displayed

¹¹In this exercise, due to data limitation when we move from AnaCredit data to BSI data, we re-define fixed-rate loans as those with original maturity above 5 years.

Table 2: Share of retail deposits

	(1)	(2)	(3)
$\widehat{u}_{b,y}$	0.0703*** (0.001)	0.0572*** (0.007)	0.0026*** (0.005)
Year FE	no	yes	yes
Bank FE	no	no	yes
Observations	75.307	75.307	75.307
R-squared	0.003	0.162	0.981

Notes: this table shows the relation between our measure of banks' exposure to APP-induced deposits inflows, as defined in 2, and the share of actual retail deposit inflows from households at the bank level, as the dependent variable.

in Table 3. Also in this case, we progressively saturate the OLS relation in column (1), by including year and year and bank fixed effects. In all cases, the relationship remains positive and significant, as assumed.

Table 3: New fixed-rate loans to NFCs

	(1)	(2)	(3)
Share of retail deposits	0.3925*** (0.005)	0.1139** (0.010)	0.0507** (0.022)
Year FE	no	yes	yes
Bank FE	no	no	yes
Observations	14.138	14.138	14.136
R-squared	0.309	0.039	0.628

Notes: this table shows the relation between the actual retail deposit inflows from households at the bank level and the flow of new fixed-rate loans as dependent variable.

Also in this case, we progressively saturate the OLS relation in column (1), by including year and year and bank fixed effects. In all cases, the relationship remains positive and significant, as assumed.

Finally, we further refine the test of the link between our proxy of APP-induced deposits and new fixed-rate loans by regressing the latter directly on our proxy $\widehat{u}_{b,y}$. This is a particularly severe test as it estimates the direct effect between the liability-duration shock at the bank level and its supply of new fixed rate loans. However, also in this strict setup, we are able to identify a positive relationship, which is statistically significant in two specifications out of three (Table 4).

Table 4: new fixed-rate loans to NFCs

	(1)	(2)	(3)
$\widehat{u_{b,y}}$	0.0413*** (0.011)	0.0310*** (0.010)	0.0032 (0.007)
Year FE	no	yes	yes
Bank FE	no	no	yes
Observations	12.782	12.782	12.78
R-squared	0.002	0.018	0.613

Notes: this table shows the relation between the actual retail deposit inflows from households at the bank level and the flow of new, fixed-rate loans.

To what extent could this re-composition also be influenced by demand dynamics? First, there is no reason to expect that demand would (exogenously) increase more for firms connected to banks with higher APP-induced deposits. Second, the time dummies should account for any general increase in demand common across firms, driven by the low interest rates prevailing during that period.

5.2 Relevance at the firm level

Based on the previous considerations, we move to the firm level analysis outlined in equation 7. Results are presented in Table 5. Here we test the relation between our instrument for APP-induced deposits and the share of new variable loans at the firm level. Columns (1)-(2) display the results of this estimation for two alternative definitions of floating rates loans. Column (1) looks at total loans at variable rates (“Var”) while column (2) only considers variable-rate term credit and credit lines (“Var. TC”). Both variables are scaled by total bank debt. Throughout the paper we will consider both definitions, as they each have pros and cons. Looking at the totality of bank credit (term loans, credit lines, trade receivables, overdraft, reverse repo, revolving credit, and other) allows to comprehensively assess a firm’s exposure to variable rate credit. At the same time, focusing on term credit only allows to sharpen the estimation of the effect on investment, which are typically funded with these loans. Scaling by total bank credit allows to assess how relevant is the portion of variable credit over total bank credit.

Table 5: Relevance at the firm level

	(1)	(2)
	Float rate loans	Float rate term credit and credit lines
APP-induced deposits	-0.077*** (0.004)	-0.054*** (0.004)
Observations	2,500,983	2,500,983
R-squared	0.77	0.79
F-statistic	302.12	159.67
Sector×Country×Year FE	yes	yes
Firm FE	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the estimation of the first stage regression (see equation 7, that is, the effect of the proxy for APP-induced deposits, as defined in equation 2, on the share of new floating rate loans, scaled by total bank loans, at the firm level.

As for the fixed-effects, we include in both regressions both firm and sector×country×year FEs. These are meant to capture all time-invariant firm characteristics and firm-invariant time, geographical and sectorial characteristics that may alter the demand for fixed/floating credit loans, in a way that may be spuriously correlated with bank’s exposure to our shock.

In either specification, we detect a negative and significant effect of our APP-induced deposits proxy on the share of floating bank credit.

In Table A1 in the Appendix we present the same results but considering an alternative scaling of variable-rate loans, that is, by total external debt, given by the sum of bank and non-bank debt. This tests whether the effect also also hold when considering the totality a firm’s funding choices, beyond bank credit. This will be of interest in the second stage, to make sure that the effect of the cashflow channel on investment is detectable also when a firm’s floating rate exposure is scaled by its overall debt (and not just bank debt). As can be seen, results in Table 5 are robust to scaling the share of floating bank debt by total firm debt.

We test the robustness of our first-stage findings in two ways. First, we introduce a number of variations to the aggregation procedure for our shock (APP-induced deposits) at the firm level. In our baseline analysis just discussed, we aggregate each bank’s shock for a

given firm by weighting it by the share of term credit and credit lines granted by that bank relative to the firm’s credit lines and term credit by all banks it is engaged with, all as of December 2019. This approach gives greater weight to shocks from the firm’s main lender of term credit, which is typically used for investment—our primary dependent variable in the second stage.

In Table A2 we play with these choices. Panel A) reports, for comparison, the estimates presented in Table 5. In panel B), we compute the weights using the share of total credit, rather than just term credit and credit lines. This adjustment gives more prominence to the shocks experienced by “larger” lenders, who may also have closer relationships with the firm. Results are broadly unchanged.

We then compute these two weights (i) shares of term credit and credit lines and ii) shares of total loans) as of December 2018, rather than 2019. Again, we do not see meaningful changes in the estimates, which confirm a solid, robust, negative relationship between the shock at the firms’ lender level and its share of floating loans (panels C and D).

Before moving to the IV results, we carry one final robustness, aiming to better account for potential confounding demand dynamics. In Table A3 we augment the baseline estimates in Table 5 by including a comprehensive set of time-varying firm characteristics, lagged by one year. Specifically, these include the firm’s leverage (debt to total assets), cash to total assets, size (measured as the logarithm of firm’s total assets), and the number of total lenders (see Section 3 for details).

The coefficient on our APP-induced deposits proxy remains negative, significant and of a comparable magnitude with respect to that in Table 5. Among the firm-level variables, we find that firm size and the number of lenders are strongly and positively associated with the share of floating rate bank debt. This aligns with the notion that larger firms, which are also likely to entertain more credit relations simultaneously, are more likely to use this form of financing, which is more complex to manage due to the variability in its financial burden. Cash holdings are negative related to the share of variable rates. This too is consistent with

the idea that variable rate financing is a complex and risky form of financing, that is avoided by cash-rich firms.

Tables [A4](#) and [A5](#) report results for these two robustness when the share of floating rate is scaled by total debt.

5.3 Exclusion restriction

In our context, exclusion restriction implies that our proxy for non-borrowed reserves *at a given firm's lender* impacts that firm's investments, employment and sales only through the changes they induce in the fixation period of the supplied loans.

The main threat to identification is that central banks reserves also impact investments directly via the aggregate demand channel, which would result in a larger intermediated quantity of loans.

First, we do not use directly the level of central bank reserves as our instrument, but we use that part of reserves that is “non-borrowed” by the bank, further netting it from bank and time fixed effects. This allows the instrument to capture only that part of reserves linked to a change in household deposits with the bank. As it is unlikely that the aggregate demand channel operates only via those firms connected with banks experiencing a higher influx of APP-induced deposits, we are confident we are not capturing contemporaneous demand dynamics. In addition, in both first and second stage regressions, we include time dummies and a number of time-varying firm characteristics that should control for the aggregate demand channel of monetary policy, which should reach all firms regardless of the reserves sitting with their lenders.

Second, we acknowledge that non-borrowed reserves may directly affect credit supply and, through it, investment, constituting a potential violation of the exclusion restriction beyond the fixed-versus-floating composition channel ([Altavilla et al., 2025](#)). Since conditioning on contemporaneous total debt would introduce a bad control problem — as debt levels may themselves be affected by the instrument — we instead include the lagged ratio of total

financial debt over assets in the second stage. We additionally test directly whether our instrument has any significant effect on loan growth in our sample (Table A6). Neither the contemporaneous nor the lagged effect of non-borrowed reserves on total loan growth is statistically significant, providing no evidence of an active broad credit supply channel in our setting. The lagged coefficient for fixed-rate loan supply is however positive, consistent with Altavilla et al. (2025)

An additional threat to identification comes from the fact that reserves are not randomly allocated across banks. Banks try to dispose as much as possible of these assets on which, in the period under study, they pay an interest rate, owing to the negative interest rate environment (Ryan and Whelan (2021)). This is problematic to the extent that a bank’s lower ability to manage its liquidity also captures some preferences to lend to firms with systematically different investment rates. We control for this possibility by adjusting for bank dummies in the computation of the “clean” instrument.

6 Results: the floating rate channel

Having established the relevance of our instrument for the share of floating rate loans, we now examine the causal effect of its variations on investment. Consistent with the idea that fixed-rate rate loans are firms’ preferred method for financing investments, we expect this effect to be negative¹². We embed in the same regression also the interaction between the share of floating rate and our measure of monetary policy (i.e. the 3M Euribor rate) to pin down specifically the floating rate channel.

In practice, we run a two-stage least square estimation, as described in equation 9.

¹²To interpret the coefficients, note that a negative relationship in the first stage means that the instrument decreases the endogenous variable. Accordingly, the second stage estimate will inform on how much that change in the endogenous variable (driven by the instrument) affects the outcome, but in the opposite direction. In other words, negative second stage estimates imply that the decrease in the endogenous variable (share of floating loans) caused by the instrument (APP-induced deposits) leads to an increase in the outcome (Investment). The overall effect associated with a negative second-stage coefficient on the instrumented floating-rate loans is that APP-induced deposits, by lowering the share of variable rate loans, cause investment to increase.

Results are displayed in Table 6. The dependent variable is the yearly change in investments, winsorized at (2.5p and 97.5p). All regressions feature firm and sector×country×year fixed effects, as well as a number of firm time-varying characteristics: leverage, cash, size and number of lenders. For this and all of the following tables we report in the Appendix the results obtained by scaling the share of floating rate loans by total - not only bank - debt. We do so to improve readability and in consideration of the fact that the recourse to Orbis data for bank debt strongly reduces the observations.

Table 6: The floating rate channel

	Float rate loans		Float rate TC		Float rate loans		Float rate TC	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Share of floating debt	0.002 (0.002)	-0.419*** (0.093)	-0.018*** (0.002)	-0.563*** (0.127)	0.002 (0.002)	-0.249*** (0.075)	-0.017*** (0.002)	-0.304*** (0.093)
Share of float. debt*Euribor3m					-0.005*** (0.001)	-0.034*** (0.008)	-0.011*** (0.001)	-0.035*** (0.008)
Debt / asset	-0.081* (0.047)	-0.082* (0.048)	-0.081* (0.047)	-0.078* (0.045)	-0.081* (0.047)	-0.082* (0.047)	-0.081* (0.047)	-0.080* (0.046)
Cash / asset	0.984*** (0.010)	0.883*** (0.025)	0.980*** (0.010)	0.881*** (0.026)	0.984*** (0.010)	0.923*** (0.021)	0.980*** (0.010)	0.928*** (0.020)
Firm size	-0.405*** (0.003)	-0.406*** (0.003)	-0.405*** (0.003)	-0.402*** (0.003)	-0.405*** (0.003)	-0.407*** (0.003)	-0.406*** (0.003)	-0.405*** (0.003)
Nr of lenders	-0.010*** (0.001)	-0.005*** (0.002)	-0.009*** (0.001)	0.000 (0.003)	-0.010*** (0.001)	-0.006*** (0.001)	-0.009*** (0.001)	-0.004* (0.002)
Constant	2.949*** (0.022)		2.956*** (0.022)					
Observations	3,108,446	3,108,446	3,108,446	3,108,446	3,108,446	3,108,446	3,108,446	3,108,446
R-squared	0.312	0.008	0.312	-0.002	0.312	0.026	0.312	0.026
Cragg-Donald Wald F statistic		966.125		660.138		716.997		579.617
Country×Sector×Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results, as in 9, which estimate the instrumented relation between a firm’s share of floating rate loans, scaled by total bank debt, on its investments growth rate. “Float rate TC” is floating rate term credit and credit lines. Negative R-squared values may appear in IV/2SLS and simply indicate that R-squared is not informative here; the Cragg-Donald F-statistic is the relevant diagnostic.

We consider instruments for both measures of floating-rate share discussed in the previous subsection, that is: floating credit over bank debt (col 1-2, 5-6) and floating term-credit and credit lines over bank debt (col 3-4, 7-8). The first four columns report the impact of the

floating-rate loan share not interacted, while the latter ones include the interaction with the monetary policy rate (3M Euribor) For each variable we first present the endogenous OLS estimates (odd columns) and then the IV ones (even columns). At the bottom of the table we report the F-statistics.

In general, we detect a negative, statistically significant effect of the share of floating credit on investment when using our IV strategy. Note also that the F-statistic is very high, suggesting that the instrument is strongly correlated with the endogenous variable, allowing the estimation to deliver precise estimates. This negative effect is found also in two of the four OLS specifications (col. 3 and 7), i.e. without controlling for the endogeneity between a firms' choice of borrowing at variable rates and its investment schedule. However, when we instrument the firm's share of floating rate with the firm's lenders deposits share, this effects becomes sensibly stronger.

Moving to the coefficient of the interaction term between the share of floating rate and the Euribor rate, which captures the floating rate channel of monetary policy on firms' investment choices, results are consistently negative and statistically significant (col. 5-8). Also in the case of the interaction, the magnitude of the coefficient increases strongly when moving from the OLS to the IV estimates.

Interestingly, when adding the interaction term, the direct effect of floating-rate debt share remains negative and significant for compliers, though reduced in magnitude. For firms whose debt composition was exogenously altered by their banks' reserve-induced portfolio rebalancing, floating-rate exposure dampens investment both through the monetary policy transmission channel (interaction term) and through a direct channel operating independently of policy rate changes.

On average, a 1 percentage point increase in the share of floating-rate debt is associated with a reduction of slightly more than 0.4 percentage points in the investment rate (col. 2 of Table 6). This adverse impact on investment could be linked to the heightened interest rate risk faced by firms, which may hamper profitability expectations (or widen the uncertainty

surrounding them) and thus reduce investment.

As for the interaction term, it clearly confirms the existence of the floating rate channel in our sample. In terms of economic significance, our results indicate that the floating rate channel significantly influenced corporate investments in Europe. Point estimates in column 6 of Table 6 can be read in the following way: an increase of 450 basis points in the 3-month Euribor rate (comparable to the highest year-on-year increase in interest rates observed during the monetary tightening of 2022-23) would lead to a 14.8 percentage points additional reduction in the investment rate (whose average value on the sample is 14 percent) for firms with a high share of floating-rate debt (at the 75th percentile, corresponding to a debt share of 97 percent) compared to firms with exclusively fixed-rate debt (accounting for approximately two-fifths of the sample).

For both the non-interacted and interacted coefficients just discussed, the magnitude of the OLS estimates is considerably lower than that of the IV estimates. This discrepancy reflects the strong negative estimation bias that arises from regressing directly a firm’s share of variable loans on its investment decisions, owing for instance to an omitted variable positively correlated with investment and negatively correlated with floating-rate loans. The magnitude of the IV estimates may also be related to the fact that this technique delivers local average treatment effects, contrary to OLS estimates that capture average effects across the whole population: the IV estimate reflects the effect for those firms “treated” by being linked to banks that received a larger influx of APP-induced deposits, averaging out the effect for treated and non-treated firms.¹³

As for the remaining controls in the regressions, we document that the investment rate is more negative for larger and more highly leveraged firms and for firms with more borrowers.

Before moving to investigate in the next Section whether the floating rate channel has

¹³We acknowledge that large IV-to-OLS ratios can also signal violations of the exclusion restriction rather than reflecting LATE alone. However, the consistently high Cragg-Donald F-statistics rule out weak instrument bias, and the null result on total loan growth in Table A6 provides no evidence that the instrument captures channels beyond debt composition. A definitive test of the exclusion restriction remains, as always in IV settings, unavailable.

implications beyond its effect on investment, we discuss whether its impact was heterogeneous across sectors of activity. This is relevant for a policy perspective, to monitor the sectors more exposed to this channel when gauging the intensity of the monetary transmission.

In practice, we split firms in our sample according to four macro-sectors: agriculture and other sectors, construction, manufacturing, and services and re-run the analysis in Table 6. Results are presented in Table 7. We do not detect a negative effect for firms in the agriculture sector, where investment is on average significantly lower. For companies in all other sectors, we document the presence and statistical significance of the floating rate channel. As for the direct effect of the floating-rate loan share on investment we only detect it for firms in the service sector, which are also the most numerous.

Table 7: The floating rate channel by sector of economic activity

	Float rate loans	Float rate term credit and credit lines
Agriculture and other sectors		
Share of floating debt	-0.095 (0.747)	-0.250 (2.202)
Share of floating debt * Euribor 3m	0.038 (0.031)	0.036 (0.040)
Observations	162,922	162,922
R-squared	0.06	0.05
Cragg-Donald Wald F statistic	3.54	0.48
Constructions		
Share of floating debt	-0.339 (0.359)	-0.355 (0.375)
Share of floating debt * Euribor 3m	-0.056** (0.024)	-0.060** (0.026)
Observations	401,708	401,708
R-squared	0.01	0.01
Cragg-Donald Wald F statistic	39.68	44.41
Manufacturing		
Share of floating debt	-0.177 (0.266)	-0.311 (0.474)
Share of floating debt * Euribor 3m	-0.033* (0.019)	-0.031* (0.019)
Observations	570,121	570,121
R-squared	0.04	0.03
Cragg-Donald Wald F statistic	54.97	21.79
Services		
Share of floating debt	-0.252*** (0.076)	-0.294*** (0.089)
Share of floating debt * Euribor 3m	-0.030*** (0.011)	-0.032*** (0.010)
Observations	1,946,571	1,946,571
R-squared	0.03	0.03
Cragg-Donald Wald F statistic	722.09	647.44
Country×Sector×Year FE	yes	yes
Firm FE	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results, as in 9, which estimate the instrumented relation between a firm's share of floating rate loans, scaled by total bank debt, on its investments growth rate, by sector of economic activity.

In the Appendix Tables [A7](#) and [A8](#) we report the results obtained by scaling the share of floating-rate loans by total debt from Orbis. Results are fully confirmed for the whole sample. When we look at the sub sectors separately, we retain significance of the interacted coefficient only for firms in the service sector, while the sign remains throughout negative. This is likely due to the strong sample reduction in Construction and Manufacturing owing to both the use of Orbis data, less populated than Anacredit, and the coverage of companies in these sectors within Orbis.

6.1 Heterogeneities in the floating rate channel

In this section, we approach the floating rate channel from a broader perspective, and investigate in the same framework two related questions. First, we address this issue of heterogeneity by firm size. Do smaller firms suffer more from the activation of this channel compared to larger? Second, we ask if other firms' choices are affected by the channel, beyond investment, to adjust for the rising cost of bank debt servicing.

Our working hypothesis is that the negative effect of the channel is stronger for smaller firms. Smaller firms are indeed known to have fewer funding sources, both in terms of number of banking relations and as access to market funding. This means that they also have lower margins to patch the increase in costs of existing debt, especially if these come unexpectedly.

In addition, we also expect that, faced with an increase in the cost of debt, firms not only pull off longer term investment plans, but contemporaneously also pull other levers to contain costs. They may reduce their liquidity holdings. They may also decide to scale down on employment, to contain costs, or, alternatively, they may ramp up employment to make up for the foregone investments by intensifying the use of labor.

To investigate these possibilities, we split the sample of analysis between small and large firms, separating firms with assets below and above the median of the distribution, and re-run the IV analysis described in the previous section for the following outcome variables: employment (head count), staff cost, cashflow, sales and profitability (EBIT), cash and

current assets (stocked supplies), winsorized at (2.5p and 97.5p). Results are displayed in Tables 8-12.

First, we document that both smaller and larger firms reduce investment in response to a monetary tightening at a broadly comparable rate and in line with the results discussed for the whole sample (Table 8).

Table 8: Effect on Investment: Floating rate channel by firm size

	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-0.228** (0.095)	-0.264** (0.111)	-0.429*** (0.113)	-0.559*** (0.150)
Share of floating debt × Euribor 3m	-0.036*** (0.010)	-0.040*** (0.011)	-0.044*** (0.015)	-0.037*** (0.013)
Observations	1,763,410	1,763,410	1,285,394	1,285,394
R-squared	0.03	0.03	0.01	-0.00
Cragg–Donald Wald F statistic	511.42	463.12	276.08	197.07
Ctry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results, as in 9, which estimate the instrumented relation between a firm’s share of floating rate loans, scaled by total bank debt, on its investments growth rate, by firm dimension, where small (large) firms are those with assets below (above) the sample median. “Float rate TC” is floating rate term credit and credit lines. Negative R-squared values may appear in IV/2SLS and simply indicate that R-squared is not informative here; the Cragg-Donald F-statistic is the relevant diagnostic.

Second, in terms of employment (head count), we find that smaller firms tend to reduce it, while we find no effect on larger firms (Table 9, panel a). These dynamics are matched by those of the cost of employees (panel b). Smaller firms tend to reduce their costs in a significant way, suggesting a scaling down not only of the extensive but also of the intensive margin of employment. Larger firms, on the contrary, do not witness a comparable (in size and significance) decrease in the cost of labor. This suggests that smaller firms more exposed to the increased in the cost of capital stemming from the policy hikes were unable to shift

the production process towards a more intense labor usage.

Table 9: Effect on Employment and Cost of Employees: Floating rate channel by firm size

Panel A: Employment				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-0.104* (0.054)	-0.123* (0.064)	-0.162*** (0.050)	-0.212*** (0.067)
Share of floating debt × Euribor 3m	-0.007 (0.005)	-0.009* (0.005)	-0.006 (0.006)	-0.006 (0.005)
Observations	1,294,832	1,294,832	1,079,878	1,079,878
R-squared	-0.01	-0.01	-0.03	-0.05
Cragg-Donald Wald F	279.39	249.68	211.41	155.17
Ctry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Panel B: Cost of Employees				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-0.604*** (0.090)	-0.626*** (0.094)	-0.326*** (0.085)	-0.358*** (0.094)
Share of floating debt × Euribor 3m	-0.021** (0.008)	-0.025*** (0.010)	-0.015* (0.008)	-0.012 (0.009)
Observations	1,086,264	1,086,264	845,627	845,627
R-squared	-0.12	-0.10	-0.08	-0.08
Cragg-Donald Wald F	289.00	338.57	142.15	148.09
Ctry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results on employment and on the cost of employees, as in 9, which estimate the instrumented relation between a firm’s share of floating rate loans, scaled by total bank debt, on its investments growth rate, by firm dimension, where small (large) firms are those with assets below (above) the sample median. “Float rate TC” is floating rate term credit and credit lines. Negative R-squared values may appear in IV/2SLS and simply indicate that R-squared is not informative here; the Cragg-Donald F-statistic is the relevant diagnostic.

Third, the overall cashflow decreases for smaller firms, but not for larger firms (Table 10, panel a)). Cash, on the other hand, decreases for both large and smaller firms, in a stronger way for the latter ones (panel b). This is consistent with the idea that companies draw on their liquidity resources in response to higher interest payments. The stronger impact on liquidity for smaller firms is possibly also related to the negative impact on employment, suggesting that smaller companies have less financial resources to sustain staff costs when other negative shocks to production costs materialize.

Fourth, consistently with the above, sales are also negatively impacted for smaller companies (Table 11, panel a) suggesting a reduction in quantities sold and/or a decrease in price. At the same time, there is no significant effect on sales for larger firms. Since sales compound both prices and quantities, this finding can be rationalized by arguing that larger firms, which typically have more market power, manage to recover some of the increased debt service costs by raising prices. This is consistent with the findings in (Core et al., 2024), who show that firms more exposed to floating rate debt with more market power have reduced prices by less, to make up for the higher financial burden. Profits decline for smaller firms, but not for larger ones (panel b).

Current assets (stocked supply) decrease significantly for smaller firms (Table 12, panel b) indicating that, in absence of new investment and with declining employment, these companies deplete their stocks to keep the orders flowing. However, this proves not to be enough, and smaller firms end up reporting a general downsizing in total assets (panel a). While no effect on current assets is documented for larger firms, total assets show a negative and marginally significant coefficient at the 10 percent level, pointing to a weaker and less robust contraction compared to smaller firms.

Broadly, these dynamics indicate that the floating rate channel is active and binding for all firms, when considered from the “narrow” perspective of investment plans. Yet, when broadening the picture to other firm outcomes, it appears that larger firms suffer somehow less. In particular, larger firms seem more able to rebalance production inputs (capital and

Table 10: Effect on Cash Flow and Cash: Floating rate channel by firm size

Panel A: Cash Flow				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-1.321*** (0.353)	-1.375*** (0.372)	-0.293 (0.424)	-0.325 (0.469)
Share of floating debt × Euribor 3m	-0.129*** (0.035)	-0.162*** (0.041)	0.017 (0.047)	0.020 (0.047)
Observations	1,264,337	1,264,337	919,079	919,079
R-squared	-0.03	-0.02	0.01	0.01
Cragg-Donald Wald F	342.56	385.36	147.06	148.59
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes
Panel B: Cash				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-6.888*** (0.922)	-8.012*** (1.093)	-6.066*** (1.173)	-7.925*** (1.576)
Share of floating debt × Euribor 3m	-0.468*** (0.086)	-0.585*** (0.094)	-0.429*** (0.146)	-0.371*** (0.123)
Observations	1,739,862	1,739,862	1,276,540	1,276,540
R-squared	-0.07	-0.08	-0.05	-0.08
Cragg-Donald Wald F	496.84	450.35	274.78	195.71
Cntry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results on cashflow and cash, as in 9, which estimate the instrumented relation between a firm’s share of floating rate loans, scaled by total bank debt, on its investments growth rate, by firm dimension, where small (large) firms are those with assets below (above) the sample median. “Float rate TC” is floating rate term credit and credit lines. Negative R-squared values may appear in IV/2SLS and simply indicate that R-squared is not informative here; the Cragg-Donald F-statistic is the relevant diagnostic.

labor) towards the least expensive one and they appear to be able to use their ampler market power to keep up the sales growth.

Table 11: Effect on EBIT and Sales: Floating rate channel by firm size

Panel A: EBIT				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-1.296*** (0.406)	-1.341*** (0.423)	0.179 (0.564)	0.194 (0.615)
Share of floating debt × Euribor 3m	-0.102** (0.042)	-0.128*** (0.049)	0.048 (0.064)	0.048 (0.064)
Observations	1,394,488	1,394,488	957,463	957,463
R-squared	-0.01	-0.01	0.01	0.01
Cragg-Donald Wald F	429.87	492.56	162.19	167.34
Cntry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Panel B: Sales				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-0.660*** (0.080)	-0.734*** (0.091)	-0.662*** (0.124)	-0.718*** (0.138)
Share of floating debt × Euribor 3m	-0.021*** (0.008)	-0.029*** (0.009)	-0.014 (0.013)	-0.005 (0.013)
Observations	1,145,242	1,145,242	856,655	856,655
R-squared	-0.15	-0.16	-0.18	-0.18
Cragg-Donald Wald F	355.09	348.34	134.16	138.64
Cntry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results on EBIT and sales, as in 9, which estimate the instrumented relation between a firm’s share of floating rate loans, scaled by total bank debt, on its investments growth rate, by firm dimension, where small (large) firms are those with assets below (above) the sample median. “Float rate TC” is floating rate term credit and credit lines. Negative R-squared values may appear in IV/2SLS and simply indicate that R-squared is not informative here; the Cragg-Donald F-statistic is the relevant diagnostic.

Smaller firms, on the contrary, are documented to scale down activity across the board, scaling down not only investment, but also employment, assets and sales. This result under-

Table 12: Effect on Total and Current Assets: Floating rate channel by firm size

Panel A: Total Asset				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	0.048* (0.029)	0.058* (0.034)	-0.076** (0.037)	-0.099** (0.048)
Share of floating debt × Euribor 3m	-0.008** (0.003)	-0.007** (0.003)	-0.009* (0.005)	-0.007* (0.004)
Observations	1,763,410	1,763,410	1,285,394	1,285,394
R-squared	0.30	0.30	0.31	0.31
Cragg-Donald				
Wald F	511.42	463.12	276.08	197.07
Cntry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Panel B: Current Asset				
	Small firms		Large firms	
	Float rate loans (1)	Float rate TC (2)	Float rate loans (3)	Float rate TC (4)
Share of floating debt	-0.012 (0.054)	-0.012 (0.063)	0.022 (0.072)	0.029 (0.094)
Share of floating debt × Euribor 3m	-0.013** (0.005)	-0.013** (0.006)	-0.002 (0.010)	-0.002 (0.008)
Observations	1,763,401	1,763,401	1,285,353	1,285,353
R-squared	0.19	0.19	0.16	0.16
Cragg-Donald				
Wald F	511.41	463.11	276.08	197.07
Cntry×Sector×Yr FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the second stage results on total and current assets, as in 9, which estimate the instrumented relation between a firm’s share of floating rate loans, scaled by total bank debt, on its investments growth rate, by firm dimension, where small (large) firms are those with assets below (above) the sample median. “Float rate TC” is floating rate term credit and credit lines.

score the importance of supporting smaller firms’ access to alternative funding sources, and to enhance financial literacy regarding the features of different debt instruments.

In the Appendix Tables [A9-A13](#), we present the results that we would obtain when scaling the exposure to floating rate by total debt, rather than by bank debt. We have already discussed above the drop in sample numerosity that accrues from this change. Nonetheless, the bulk of the results just discussed are robust to the change, and the broad narrative of smaller firms bearing the brunt of the floating rate channel is confirmed.

7 Conclusion

In this work, we rely on Anacredit and Orbis data to quantify the heterogeneity in the transmission of the 2022-23 tightening cycle to euro area firms through the floating rate channel. As firms' exposure to floating rate loans is not exogenous to their real activity outcomes, we instrument it with the random exposure of their lenders to the inflow of retail deposits ensuing the ECB Asset Purchase Program.

The negative and statistically significant coefficient on the interaction between the share of floating-rate debt and the Euribor rate provides direct evidence of the floating-rate channel of monetary policy transmission to corporate investment. This channel played a critical role in shaping investment dynamics in Europe. The economic significance of our estimates is substantial: a 450 basis point increase in the 3-month Euribor rate—comparable to the sharpest year-on-year rate hike during the 2022–23 monetary tightening—would lead to an additional 14.8 percentage point decline in the investment rate for firms with a high share of floating-rate debt (at the 75th percentile, or 97 percent of total debt) relative to firms with exclusively fixed-rate debt, which constitute more than 25 percent of the sample. More broadly, our findings indicate that a greater reliance on floating-rate debt systematically dampens investment. On average, a one percentage point increase in the share of floating-rate debt is associated with a decline of slightly more than one-third of a percentage point in the investment rate. This adverse effect, which warrants further investigation, may be driven by the heightened exposure to interest rate risk among firms with significant floating-rate liabilities.

8 Appendix A: Modelling the floating rate channel

We develop a stylized framework to rationalize our empirical strategy. The model isolates a mechanism through which monetary policy affects investment via the repricing of floating-rate liabilities. Firms differ in the share of their debt indexed to short-term rates, generating heterogeneity in their exposure to policy changes.

Consider a firm with operating cash flow Π_t^{op} from its business operations. The firm holds total debt D_t , composed of floating-rate and fixed-rate components.¹⁴ Let $s_t \in [0, 1]$ denote the share of floating-rate debt. The interest burden is $D_t[s_t r_t + (1 - s_t)r^X]$, where r_t is (an affine transformation of) the short-term policy rate and r^X is a predetermined fixed rate.

Net cash flow after interest payments is:

$$\Pi_t = \Pi_t^{op} - D_t[s_t r_t + (1 - s_t)r^X]$$

To isolate the floating-rate debt channel, we assume that investment equals net cash flow:¹⁵

$$I_t = \Pi_t \tag{10}$$

This leads to a simple testable prediction: firms more exposed to floating-rate debt should display greater sensitivity to interest rate changes. Differentiating equation (10), we obtain:

$$\frac{\partial I_t}{\partial r_t} = -D_t \cdot s_t < 0$$

This floating rate channel operates purely through the liability side of the balance sheet: interest rate hikes increase the cost of servicing existing debt, compressing internal funds

¹⁴We treat the debt level as exogenous in this stylized framework. In practice, firms may endogenously adjust both the level and composition of debt in response to interest rate expectations. We address this issue in our empirical identification strategy.

¹⁵We assume that no new borrowing is needed, i.e., $B_t = 0$. This assumption shuts down the bank lending channel of monetary policy transmission, allowing us to isolate the liability-side effects that operate through the repricing of existing debt obligations.

available for investment. By abstracting from new borrowing, we isolate this mechanism from the traditional bank lending channel, which emphasizes how monetary policy affects firms' access to external finance ([Bernanke and Gertler, 1995](#); [Kashyap and Stein, 2000](#)). Our mechanism acts directly on cash flows through pre-existing debt obligations, independent of credit market conditions. We now test this prediction using firm-bank level data.

A Annex 1

Table A1: Relevance at the firm level - robustness

	(3)	(4)
	Float rate loans /Total debt	Float rate term credit and cr lines/Total debt
APP-induced deposits	-0.067*** (0.004)	-0.074*** (0.004)
Observations	1,676,928	1,676,874
R-squared	0.80	0.81
F-statistic	253.50	334.66
Sector×Country×Year FE	yes	yes
Firm FE	yes	yes

Standard errors in parentheses

Standard errors clustered at the firm level

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

Table A2: Relevance at the firm level: Robustness to alternative aggregation of the APP-induced deposits

	(1)	(2)
	Float rate loans	Float rate term credit and credit lines
Panel A) (baseline)		
<i>APP-induced deposits</i>		
<i>weighted by term credit and credit lines, 2019</i>	-0.077*** (0.004)	-0.055*** (0.004)
Observations	2,500,983	2,500,983
R-squared	0.767	0.785
Panel B)		
<i>APP-induced deposits</i>		
<i>weighted by all credit, 2019</i>	0.001 (0.005)	-0.045*** (0.004)
Observations	2,500,983	2,500,983
R-squared	0.767	0.785
Panel C)		
<i>APP-induced deposits</i>		
<i>weighted by term credit and credit lines, 2018</i>	-0.089*** (0.006)	-0.067*** (0.006)
Observations	2,500,983	2,500,983
R-squared	0.767	0.785
Panel D)		
<i>APP-induced deposits</i>		
<i>weighted by all credit, 2018</i>	-0.029*** (0.006)	-0.057*** (0.006)
Observations	2,500,983	2,500,983
R-squared	0.767	0.785

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the results of testing the robustness of first stage results to alternative aggregation of the APP-induced deposits.

Table A3: Relevance at the firm level: Robustness to the inclusion of firm controls

	(1)	(2)
	Float rate loans	Float rate term credit and credit lines
APP-induced deposits	-0.067*** (0.004)	-0.043*** (0.004)
Debt/asset	0.001* (0.001)	0.002 (0.003)
Cash/asset	-0.035*** (0.003)	-0.023*** (0.002)
Firm size	0.008*** (0.001)	0.010*** (0.001)
Number of lenders	0.011*** (0.000)	0.013*** (0.000)
Observations	2,500,983	2,500,983
R-squared	0.770	0.790
F-statistic	259.480	293.500
Sector×Country×Year FE	yes	yes
Firm FE	yes	yes

Standard errors in parentheses, clustered at the firm level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Notes: this table presents the results of testing the robustness of first stage results to the inclusion of firm-level time-varying controls.

Table A4: Relevance at the firm level - Robustness

	(3)	(4)
	Float /Total debt	Float TC credit /Total debt
A) APP-induced deposits		
<i>weighted by term credit and credit lines, 2019</i>	-0.067*** (0.004)	-0.074*** (0.004)
Observations	1,676,928	1,676,874
R-squared	0.798	0.809
B) APP-induced deposits		
<i>weighted by all credit, 2019</i>	-0.048*** (0.004)	-0.052*** (0.004)
Observations	1,676,928	1,676,874
R-squared	0.798	0.809
C) APP-induced deposits		
<i>weighted by term credit and credit lines, 2018</i>	-0.055*** (0.005)	-0.063*** (0.005)
Observations	1,676,928	1,676,874
R-squared	0.798	0.809
D) APP-induced deposits		
<i>weighted by all credit, 2018</i>	-0.046*** (0.005)	-0.041*** (0.005)
Observations	1,676,928	1,676,874
R-squared	0.798	0.809

Note: Standard errors in parentheses. *** p = 0.01, ** p = 0.05, * p = 0.1

Table A5: Relevance at the firm level - Robustness

	(3)	(4)
	Float /Total debt	Float TC credit /Total debt
APP-induced deposits	-0.059*** (0.004)	-0.066*** (0.004)
Debt/asset	-0.004*** (0.001)	-0.002*** (0.000)
Cash/asset	-0.022*** (0.002)	-0.010*** (0.002)
Firm size	0.000 (0.001)	0.002*** (0.001)
Number of lenders	0.010*** (0.000)	0.010*** (0.000)
Observations	1,676,928	1,676,874
R-squared	0.800	0.810
F-statistic	177.440	216.150
Sector×Country×Year FE	yes	yes
Firm FE	yes	yes

Standard errors in parentheses

Standard errors clustered at the firm level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ **Table A6:** Loan growth regressions

Dep. Var.	Loan growth rate in year t			Loan growth rate in year $t + 1$		
	Floating rate	Fixed rate	Total	Floating rate	Fixed rate	Total
	(1)	(2)	(3)	(4)	(5)	(6)
u_t	-1.508 (1.617)	-0.0283 (0.0221)	-0.959 (1.207)	0.718 (0.900)	-0.300 (0.379)	0.517 (0.722)
Nr. Observations	1,441,286	1,139,900	2,352,925	1,463,731	1,164,921	2,398,739
R ²	0.084	0.015	0.029	0.084	0.015	0.029
Fixed Effects Cluster	Firm×year, Bank Firm-Bank					

Notes: Robust standard errors, clustered at the firm and bank level, are reported in parentheses. All regressions include firm-year and bank fixed effects.

Table A7: The floating rate channel

<i>Share of floating loans is:</i>	Float /Total debt		Float TC credit /Total debt		Float /Total debt		Float TC credit /Total debt	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Share of floating debt	0.001 (0.003)	-0.100 (0.112)	-0.016*** (0.003)	-0.099 (0.114)	0.001 (0.003)	0.032 (0.116)	-0.016*** (0.003)	0.035 (0.123)
Share of floating debt * Euribor 3m					-0.008*** (0.002)	-0.034** (0.014)	-0.012*** (0.002)	-0.037** (0.015)
Debt / asset	-0.217*** (0.014)	-0.224*** (0.017)	-0.218*** (0.014)	-0.222*** (0.016)	-0.217*** (0.014)	-0.215*** (0.016)	-0.218*** (0.014)	-0.216*** (0.015)
Cash / asset	0.998*** (0.011)	0.984*** (0.020)	0.997*** (0.011)	0.990*** (0.015)	0.999*** (0.011)	1.003*** (0.020)	0.997*** (0.011)	1.002*** (0.015)
Firm size	-0.427*** (0.003)	-0.430*** (0.004)	-0.428*** (0.003)	-0.429*** (0.004)	-0.428*** (0.003)	-0.427*** (0.005)	-0.428*** (0.003)	-0.428*** (0.004)
Number of lenders	-0.007*** (0.001)	-0.001 (0.007)	-0.006*** (0.001)	-0.002 (0.005)	-0.007*** (0.001)	-0.009 (0.007)	-0.006*** (0.001)	-0.008 (0.006)
Constant	3.223*** (0.025)		3.228*** (0.025)					
Observations	2,102,392	2,102,392	2,102,306	2,102,306	2,102,392	2,102,392	2,102,306	2,102,306
R-squared	0.337	0.041	0.337	0.041	0.337	0.042	0.337	0.042
Cragg-Donald Wald F statistic		1082.534		1230.950		517.958		541.451
Sector×Country×Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses

Standard errors clustered at the firm level

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

Table A8: The floating rate channel by economic sector of activity

<i>Share of floating loans is:</i>	Float Total debt	Float TC credit /Total debt
Agriculture and other sectors		
Share of floating debt	0.455 (1.252)	0.845 (2.479)
Share of floating debt * Euribor 3m	0.068 (0.086)	0.026 (0.206)
Observations	117,861	117,853
R-squared	0.03	-0.06
Cragg-Donald Wald F statistic	2.06	0.67
Constructions		
Share of floating debt	-0.135 (0.379)	-0.129 (0.357)
Share of floating debt * Euribor 3m	-0.047 (0.035)	-0.050 (0.039)
Observations	273,821	273,813
R-squared	0.03	0.03
Cragg-Donald Wald F statistic	62.79	84.74
Manufacturing		
Share of floating debt	0.257 (0.310)	0.268 (0.326)
Share of floating debt * Euribor 3m	-0.022 (0.030)	-0.029 (0.035)
Observations	380,834	380,824
R-squared	0.04	0.04
Cragg-Donald Wald F statistic	61.15	65.91
Services		
Share of floating debt	0.012 (0.133)	0.014 (0.143)
Share of floating debt * Euribor 3m	-0.044** (0.019)	-0.047** (0.020)
Observations	1,307,666	1,307,606
R-squared	0.04	0.04
Cragg-Donald Wald F statistic	429.65	432.11
Country×Sector×Year FE	yes	yes
Firm FE	yes	yes

Standard errors clustered at the firm level

Table A9: Effect on Investment: Floating rate channel by firm size

Investment

	Small firms		Large firms	
	Var./ Total debt (1)	Var. TC credit /Total debt (2)	Var./ Total debt (3)	Var. TC credit /Total debt (4)
Share of floating debt	0.169 (0.141)	0.181 (0.147)	-0.369* (0.198)	-0.402* (0.214)
Share of floating debt \times Euribor 3m	-0.047*** (0.018)	-0.051*** (0.019)	-0.009 (0.024)	-0.003 (0.027)
Observations	1,111,093	1,111,036	944,328	944,301
R-squared	0.04	0.04	0.03	0.03
Cragg–Donald Wald F statistic	420.42	466.63	147.11	143.30
Country \times Sector \times Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Table A10: Effect on Employment and Cost of Employees: Floating rate channel by firm size

Panel A: Employment				
	Small firms		Large firms	
	Var./ Total debt (1)	Float TC credit /Total debt (2)	Var./ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	-0.213*** (0.073)	-0.220*** (0.076)	-0.264*** (0.093)	-0.280*** (0.099)
Share of floating debt × Euribor 3m	0.004 (0.008)	0.007 (0.008)	0.018* (0.011)	0.023* (0.012)
Observations	813,275	813,227	798,520	798,503
R-squared	-0.02	-0.02	-0.05	-0.05
Cragg-Donald Wald F statistic	271.55	311.69	121.15	125.46
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes
Panel B: Cost of Employees				
	Small firms		Large firms	
	Float/ Total debt (1)	Var. TC credit /Total debt (2)	Float/ Total debt (3)	Var. TC credit /Total debt (4)
Share of floating debt	-0.324*** (0.105)	-0.360*** (0.117)	-0.384*** (0.128)	-0.410*** (0.137)
Share of floating debt × Euribor 3m	0.003 (0.011)	0.008 (0.012)	0.021 (0.015)	0.032* (0.018)
Observations	680,932	680,884	636,235	636,215
R-squared	-0.02	-0.02	-0.06	-0.06
Cragg-Donald Wald F statistic	290.45	294.26	106.72	110.31
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Table A11: Effect on Cash Flow and Cash: Floating rate channel by firm size

Panel A: Cash Flow				
	Small firms		Large firms	
	Var./ Total debt (1)	Float. TC credit /Total debt (2)	Var./ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	-1.879*** (0.501)	-2.039*** (0.545)	-0.363 (0.657)	-0.405 (0.716)
Share of floating debt × Euribor 3m	-0.054 (0.057)	-0.034 (0.063)	0.134 (0.087)	0.156 (0.105)
Observations	794,671	794,625	680,157	680,132
R-squared	-0.03	-0.03	0.01	0.01
Cragg-Donald Wald F statistic	299.48	310.78	100.88	97.73
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes
Panel B: Cash				
	Small firms		Large firms	
	Float/ Total debt (1)	Float TC credit /Total debt (2)	Float/ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	-4.368*** (1.312)	-4.455*** (1.354)	-6.002*** (2.102)	-6.535*** (2.271)
Share of floating debt × Euribor 3m	-0.374*** (0.139)	-0.366** (0.149)	-0.174 (0.239)	-0.081 (0.275)
Observations	1,093,659	1,093,602	937,148	937,119
R-squared	0.06	0.06	0.01	0.02
Cragg-Donald Wald F statistic	400.89	449.12	146.00	142.40
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Table A12: Effect on EBIT and Sales: Floating rate channel by firm size

Panel A: EBIT				
	Small firms		Large firms	
	Float/ Total debt (1)	Float TC credit /Total debt (2)	Float/ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	-0.724 (0.576)	-0.801 (0.628)	0.430 (0.881)	0.478 (0.944)
Share of floating debt × Euribor 3m	-0.051 (0.070)	-0.047 (0.078)	0.073 (0.119)	0.068 (0.142)
Observations	862,571	862,515	706,131	706,107
R-squared	0.00	0.00	0.00	0.00
Cragg-Donald Wald F statistic	357.23	367.55	111.84	112.42
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes
Panel B: Sales				
	Small firms		Large firms	
	Float/ Total debt (1)	Float TC credit /Total debt (2)	Float/ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	-0.351*** (0.103)	-0.382*** (0.113)	-0.983*** (0.212)	-1.038*** (0.227)
Share of floating debt × Euribor 3m	0.020** (0.009)	0.025** (0.010)	0.087*** (0.023)	0.118*** (0.028)
Observations	630,456	630,400	613,908	613,888
R-squared	-0.01	-0.01	-0.27	-0.26
Cragg-Donald Wald F statistic	250.92	264.86	83.05	86.28
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

Table A13: Effect on Total Asset and Current Asset: Floating rate channel by firm size

Panel A: Total Asset				
	Small firms		Large firms	
	Float/ Total debt (1)	Float TC credit /Total debt (2)	Float/ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	0.118*** (0.045)	0.123*** (0.047)	-0.019 (0.067)	-0.021 (0.073)
Share of floating debt × Euribor 3m	-0.006 (0.005)	-0.007 (0.006)	0.001 (0.008)	0.001 (0.009)
Observations	1,111,093	1,111,036	944,328	944,301
R-squared	0.29	0.30	0.32	0.32
Cragg-Donald Wald F statistic	420.42	466.63	147.11	143.30
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes
Panel B: Current Asset				
	Small firms		Large firms	
	Float/ Total debt (1)	Float TC credit /Total debt (2)	Float/ Total debt (3)	Float TC credit /Total debt (4)
Share of floating debt	0.142* (0.080)	0.148* (0.083)	0.097 (0.134)	0.107 (0.145)
Share of floating debt × Euribor 3m	-0.000 (0.010)	-0.001 (0.010)	0.004 (0.017)	0.002 (0.020)
Observations	1,111,090	1,111,033	944,289	944,262
R-squared	0.18	0.18	0.15	0.15
Cragg-Donald Wald F statistic	420.42	466.64	147.10	143.29
Country×Sector×Year FE	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes

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