Details Matter: Loan Pricing and Transmission of Monetary Policy in the Euro Area*

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Does the maturity of the relevant risk-free rate influence the strength of monetary policy pass-through to interest rates on new loans? To address this question, we present novel empirical evidence on lending practices across all euro-area countries, using AnaCredit data covering nearly 7 million new loans issued to nonfinancial corporations in 2022–23. We document substantial variation in (i) the prevalence of fixed- versus floating-rate loans, (ii) rate fixation periods, and (iii) reference rates. This variation results in lending rates being exposed to different segments of the risk-free rate yield curve which, in turn, influence their sensitivity to monetary policy changes. We show that loans linked to shorter-maturity risk-free rates experience more pronounced monetary pass-through. Importantly, this effect is not purely mechanical, as part of the effect is offset by adjustments in the premium, revealing previously less-explored heterogeneity in the pass-through to lending rates.

JEL Codes: E52, E43, G21, E58.

1. Introduction

Despite the single currency and common monetary policy, credit markets across euro-area member states exhibit significant heterogeneity in several dimensions (Altavilla, Gürkaynak, and Quaedvlieg 2024; Kosekova et al. 2023). One notable example is the prevalence of fixed- versus floating-rate loans (Albertazzi, Fringuellotti, and Ongena 2024). Fixed-rate loans feature nominal interest rates that remain constant over the entire duration of the loan, whereas floating-rate loans have interest rates that change over time, typically indexed to a reference rate. The latter have been shown to be more sensitive to short-term money market rate fluctuations, amplifying the transmission of monetary policy (Ippolito, Ozdagli, and Perez-Orive 2018; Tzamourani 2021).

In this paper, we argue that the mere classification of loans into fixed or floating rate fails to fully capture their distinct sensitivity to monetary policy changes. Our results show that even within these two broad loan categories, other characteristics play a significant role in the transmission of monetary policy. First, the maturity of the reference rate for floating-rate loans can vary substantially.[1] Loans with shorter reference rate maturities are more exposed to changes in monetary policy, as their interest rates quickly reflect shifts in short-term rates. Similarly, for fixed-rate loans, the degree of sensitivity depends on loan maturity (Gürkaynak, Karasoy-Can, and Lee 2022). Newly issued fixed-rate loans with shorter maturities are priced based on shorter-term risk-free rates which tend to closely track changes in policy rates. By contrast, longer-maturity fixed-rate loans are less responsive, as the underlying risk-free rate reacts more moderately to monetary policy shifts.[2] Taken together, a fixed-rate loan with, for instance, a 6-month maturity will most likely have an interest rate closer to the monetary policy rate than a floating-rate loan with a 12-month reference rate.

In this study we address the following question: does the maturity of the relevant risk-free rate affect the strength of monetary policy pass-through to interest rates on new loans? While the role of loan characteristics in monetary transmission has been examined in some depth for outstanding loans, their relevance for the pass-through to newly issued loans remains comparatively underexplored. We leverage unique loan-level information from the euro area's credit data set (AnaCredit), encompassing nearly 7 million newly issued loans to nonfinancial corporations (NFCs) in 2022–23, to examine the lending practices across all euro-area countries and investigate how these can shape the transmission of monetary policy. We first document the prevalence of fixed- and floating-rate loans, the differences in duration of rate fixation periods, as well as reference rates used in loan pricing. We build on this novel empirical evidence to move beyond the binary classification of fixed- versus floating-rate loans and propose a nuanced measure of loan sensitivity to short-term rate changes. The main advantage of our approach is that we are able to account for the maturity of the risk-free rate that is relevant for each

[1] The frequency of interest rate adjustments can also vary to a large extent. However, our analysis shows that this, in most cases, aligns closely with the maturity of the underlying reference rate.

[2] For outstanding fixed-rate loans the residual maturity is another important factor for the sensitivity to monetary policy changes. Loans with shorter residual maturities are more exposed to the prevailing monetary policy rates if they need to be refinanced, which is particularly important during periods of sharp changes in interest rates, such as the post-pandemic monetary tightening.

loan. For fixed-rate loans, this corresponds to loan maturity at origination, while for floating-rate loans, it corresponds to the maturity of the underlying reference rate. Thus, we identify the specific segment of the risk-free rate yield curve that influences a loan's interest rate.

The fact-finding exercise provides empirical evidence about previously less-explored variation in lending practices across the euro area: (i) Floating-rate loans predominate in smaller euro-area countries (e.g., Latvia, Lithuania, Cyprus, Finland, Estonia, and Ireland), accounting for approximately 90 percent of new loans in 2022–23, whereas they account for only about one-third in the Netherlands, Belgium, and Germany. (ii) For floating-rate loans, much of the observed variation across countries stems from the maturity of reference rates, which range from overnight rates to 12-month rates. For example, although Cyprus and Estonia have a high share of floating-rate loans, the reference rate maturities differ substantially. In Cyprus, over one-third of floating-rate loans are tied to reference rates with maturities of one month or less, whereas in Estonia, the majority are benchmarked to reference rates with maturities of three to six months. (iii) For fixed-rate loans, the variation arises from differences in loan maturity which, again, varies considerably across euro-area countries. In France and Italy, fixed-rate loans account for more than half of all new loans to NFCs, yet their typical maturities differ markedly. In Italy, most fixed-rate loans have a maturity of 1 year or less, while in France the majority exceeds 5 years or even 10 years.

In light of this observed variation across euro-area countries, we provide a more granular measure of sensitivity reflecting the maturity of the relevant risk-free rate. Specifically, we decompose the loan interest rate into the relevant risk-free rate at the time of issuance and the corresponding premium.[3] We show that the average maturity of the relevant risk-free rate for new loans ranges from approximately six months in Latvia and Ireland to over five

[3] Overnight indexed swap (OIS) rates serve as a robust proxy for risk-free rates, as they are directly linked to central bank policy rates. OIS rates reflect market expectations of monetary policy actions, since they are derived from overnight lending rates, which are closely guided by central bank interventions. Additionally, OIS markets are highly liquid and transparent, enabling real-time tracking of how monetary policy decisions influence interest rate expectations.

years in the Netherlands, Malta, and France. However, the average maturity of the relevant risk-free rates does not show a clear distinction between countries where fixed-rate loans predominate and those where floating-rate loans are more prevalent.

Since monetary policy affects risk-free rates differently depending on their maturity, we next show that differences in the maturity of relevant risk-free rates contributed to variations in how lending rates reacted during the post-pandemic monetary tightening. The interest rate increase for new loans between 2022:Q1 and 2023:Q4 was largely driven by the rise in the relevant risk-free rates. The contribution of these rates was particularly pronounced in some euro-area countries such as Latvia and Ireland, where floating-rate loans with short fixation periods predominate, as well as Italy, where shorter-maturity fixed-rate loans are common. In contrast, countries like the Netherlands and France, where longer-term risk-free rates play a more significant role in loan pricing, experienced a more moderate increase in lending rates due to smaller increases in these rates. This finding holds after controlling for a large set of loan-level variables and a rich set of fixed effects to account for differences in lending rate levels across countries, macroeconomic sectors, regions, and firm size. Importantly, the rise in risk-free rates was partially offset by a decline in the premium,[4] which limited the overall rise in lending rates. We find that this smoothing role of the premium is consistently present throughout the sample period and is not driven by time-varying bank heterogeneity. These results suggest that banks adjusted the premium in a way that limits the increase in lending rates for loans most exposed to rising short-term risk-free rates. This helped to smooth cross-loan differences in lending rate changes that would have been larger if lending rates had moved purely in line with the relevant risk-free rates.

We go one step further and analyze new loans to NFCs issued within a six-week period around 15 European Central Bank (ECB) Governing Council (GovC) meetings held between February 2022 and October 2023 to show that pass-through of unexpected changes

[4]The term “premium” used in this study does not refer exclusively to compensation for the default risk of the borrower. Instead, it encompasses compensation for all risks a lender assumes beyond the risk-free alternative.

in monetary policy rates strengthens for new loans linked to shorter-maturity risk-free rates. Our findings reveal that loans with shorter maturities of the relevant risk-free rates—regardless of whether they are fixed or floating rate—experience a more pronounced pass-through of monetary policy surprises. However, this effect is not purely mechanical, as part of the increase in risk-free rates is offset by adjustments in the premium. Using our estimates, a straightforward calculation suggests that the variation in the extent to which loans are exposed to short-term rates has significant implications for the aggregate pass-through from monetary policy rates to lending rates. Specifically, the pass-through in the euro area is approximately 13 percent stronger than it would be if all new loans had fixed interest rates for their entire duration. Conversely, the pass-through is significantly weaker (by about 30 percent) than if all loans were tied to risk-free rates with maturities of one month or less (e.g., if all loans were floating-rate loans linked to the one-month EURIBOR, or euro-area interbank offered rate). From a monetary policy perspective, these results are important, as they reveal previously less-explored heterogeneity in the pass-through of monetary policy to lending rates within the single monetary union that depends on how monetary policy affects the shape of the yield curve.

Our study contributes to two strands of the existing literature. First, we add to previous studies that have documented significant variation in lending practices across euro-area countries. Kosekova et al. (2023) focus on the 11 largest euro-area economies, and reveal substantial cross-country differences across multiple dimensions, including the use of various loan instruments, loan maturities, the number of bank-firm relationships, and the reliance on the main bank. Additionally, they identify large cross-country differences in average lending rates, which persist even after controlling for variations in firm characteristics and loan instrument types. Similarly, Altavilla, Gürkaynak, and Quaedvlieg (2024) document substantial differences in lending rates across the 10 largest euro-area countries, which they subsequently decompose into country-, bank-, firm-, and loan-level factors. Their analysis shows that country-level fixed effects account for approximately half of the variance in lending rates at the loan level, with the remaining variation being largely explained by bank- and firm-level factors. We extend this literature by providing detailed insights into how lending rates are constructed across euro-area countries, focusing particularly on loans' sensitivity to changes in policy rates.[5]

Although answering the question of why there are cross-country differences in lending practices falls outside the scope of this paper, the existing literature suggests that the observed variation reflects a complex set of determinants that includes various borrower and lender characteristics, macroeconomic conditions, information asymmetries, and regulatory or institutional factors. For example, Albertazzi, Fringuellotti, and Ongena (2024) find that borrower-side factors play a prominent role in driving the prevalence of fixed-rate mortgage loans. They also show that the share of new fixed-rate loans is significantly higher in countries with lower historical inflation volatility. In the context of corporate lending, Vickery (2008) shows that credit-constrained, bank-dependent firms are more likely to opt for fixed-rate debt to hedge against the risk of rising interest costs. On the supply side, banks that are sensitive to rising interest rates prefer a higher proportion of floating-rate loans. Banks' interest rate preferences also depend on capital requirements and regulatory frameworks, among other factors.[6]

Second, we add to a growing body of literature that lists reasons why monetary policy transmission might vary across countries, banks, firms, and loan types (see Altavilla, Andreeva et al. 2019; Altavilla, Canova, and Ciccarelli 2020; Beyer 2024; Bittner et al. 2022; Fricke, Greppmair, and Paludkiewicz 2024; Holton and Rodriguez d'Acri 2018; Horvath, Kotlebova, and Siranova 2018; Kashyap and Stein 2000; and Kho 2023, among many others). In particular, we add to the literature examining the role of floating-rate loans in amplifying the transmission mechanism of monetary policy. While most of the previous studies have focused on mortgage markets (Corsetti, Duarte, and Mann 2020; Di Maggio et al. 2017; Eichenbaum, Rebelo, and Wong 2022; Flodén et al. 2020; Garriga, Kydland, and Šustek 2017; Pica 2022; Tzamourani 2021), transmission to firms is relatively less explored (with a couple of notable

[5] Importantly, we also include the smaller euro-area countries in our sample, a step that further highlights the observed heterogeneity in lending practices.

[6] In a more general setting, there is an extensive body of literature on the effect of bank competition on the cost of credit; see, for example, Beck, Demirgüç-Kunt, and Maksimovic (2004); Fungáčová, Samshur, and Weill (2017).

exceptions: Core et al. 2024; Gükaynak, Karasoy-Can, and Lee 2022; Ippolito, Ozdagli, and Perez-Orive 2018).

The amplification role of floating-rate loans arises through two distinct mechanisms: first, the pricing of new loans reacts more strongly to changes in monetary policy rates, as the reference rates for floating-rate loans typically have shorter maturities; and second, the pricing of outstanding floating-rate debt adjusts periodically, directly exposing borrowers to changes in monetary policy rates. Our study focuses exclusively on the first transmission mechanism and demonstrates that it is not only the interest rate type but also specific loan characteristics that determine which segment of the risk-free rate yield curve a loan is exposed to. This, in turn, influences how sensitive interest rates on new loans are to changes in monetary policy.

In turn, the prior literature mostly emphasizes the second mechanism: the cash flow channel of monetary policy.[7] Ippolito, Ozdagli, and Perez-Orive (2018) develop a theoretical framework where unhedged floating-rate debt for financially constrained firms means that changes in monetary policy rates directly affect a firm's interest expenses on existing debt, draining its internal liquid resources and thereby constraining its ability to finance investment. They further demonstrate that the quantitative significance of this mechanism increases with the maturity of the debt, as firms remain exposed to interest rate fluctuations for a longer period. Similarly, Gürkaynak, Karasoy-Can, and Lee (2022) explore the cash flow channel by examining whether firm-level stock price responses to monetary policy changes are influenced by differences in liability structures—specifically, the proportion of fixed- versus floating-rate debt. Their findings indicate that firms with a greater share of unhedged floating-rate debt experience more pronounced stock price reactions to monetary policy changes. These firms also face stronger real effects,

[7]One potential reason why the role of fixed- and floating-rate loans in the transmission of monetary policy to new lending has received relatively limited attention is the lack of a panel structure—each newly issued loan represents a unique contract. This constrains the ability to control for loan demand and unobserved firm-time variation. However, the rich data set available in AnaCredit allows us to partially offset these limitations (see Section 3).

such as sharper declines in capital investment, total assets, and net worth.

Finally, most prior research distinguishes between fixed- and floating-rate loans, but ignores the variation within both groups which might lead to different lending rate sensitivity to changes in short-term rates. One exception is Gürkaynak, Karasoy-Can, and Lee (2022), who argue that the differences between fixed- and floating-rate debt in terms of sensitivity to monetary policy changes depend on loan maturity. Fixed-rate debt with short maturities closely resembles floating-rate debt, as both are influenced by prevailing short-term rates. However, for longer maturities, the differences become more pronounced. Floating-rate debt with long maturities effectively resets periodically, aligning with new short-term rates at each adjustment. In contrast, long-term fixed-rate debt locks in its interest rate until maturity, remaining unaffected by fluctuations in short-term rates. Building on this insight, we demonstrate that the sensitivity of loans to changes in short-term interest rates depends not only on loan maturity and rate type but also on the maturity of the underlying reference rate.

The remainder of the paper is organized as follows: Section 2 introduces the data set and highlights key stylized facts about cross-country differences in loan pricing practices across the euro area. Section 3 outlines the econometric framework and presents the study's findings. It analyzes whether differences in lending practices explain the variation in how lending rates were adjusted across euro-area countries during the post-pandemic episode of monetary tightening. It also examines how the pass-through of monetary policy changes to lending rates varies across different maturities of the relevant risk-free rates. Section 4 provides concluding remarks.

2. Data and Stylized Facts

In this section, we describe the data set and outline sample selection. We then provide some stylized facts about cross-country differences in the prevalence of fixed- and floating-rate loans, the duration of rate fixation periods, and the reference rates used in loan pricing across all euro-area jurisdictions. Building on this evidence, we propose a more nuanced measure of loan interest rate sensitivity to short-term rates which captures the maturity of the relevant risk-free rate.

2.1 AnaCredit and Sample Selection

Our main data source is AnaCredit, a confidential data set maintained by the European System of Central Banks (ESCB) which provides harmonized transaction-level information on lending to firms, covering resident banks from all euro-area countries.[8] Banks are required to report all loans to firms if their total exposure to a given borrower is equal to or exceeds EUR 25,000. The data are available at a monthly frequency and include a comprehensive set of variables that capture bank-level (ownership, total assets, etc.), firm-level (size, sector, etc.) and loan-level (loan amount, interest rate, maturity, etc.) characteristics.[9]

We impose several restrictions when selecting the sample for our analysis. We include only euro-denominated loans granted to NFCs domiciled in the euro area. Following Kosekova et al. (2023), we limit the sample to borrowers categorized as S.11 (nonfinancial corporations) under the ESA 2010 classification, from which we exclude firms that fall under NACE codes 64–66. These NACE categories cover a spectrum of financial activities, including traditional banking and credit services (NACE 64), insurance and pension funding (NACE 65), and auxiliary financial services (NACE 66) such as financial consulting, brokerage, fund management, and other support functions for the financial and insurance industries. By excluding these sectors, we ensure a targeted focus on NFCs.

AnaCredit covers a broad range of loan types, including financial leases, credit lines, revolving credit, trade receivables, and credit card debt, among others. For this study, we limit our sample to credit

[8]We consider the EA-19 composition of the euro area valid in 2022: Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Austria, Portugal, Slovenia, Slovakia, and Finland. Croatia adopted the euro on January 1, 2023, and AnaCredit data for Croatia are available starting from only 2023.

[9]For more information see the AnaCredit Manual: https://www.ecb.europa.eu/stats/ecb_statistics/anacredit/html/index.en.html.

lines, revolving credit, and other loans, as these categories encompass the majority of lending activity across all euro-area countries. Other loans include all loans that are not included in any of the other more narrowly defined categories. While this is a residual classification, it comprises typical business loans that are entirely disbursed in one installment and repaid over a set period, primarily with regular payments. Credit lines are instruments characterized by the following features that set them apart from other loan types: (i) debtors can withdraw funds up to a preapproved credit limit without prior notice to the creditor; (ii) the credit can be drawn in multiple tranches; and (iii) it is nonrevolving, meaning the available credit limit only decreases as funds are withdrawn, and repayments do not replenish the original credit amount. Revolving credit, excluding overdrafts and credit card debt, refers to any credit instrument—aside from a current account with a credit limit or credit card debt—that allows funds to be repeatedly drawn and repaid up to a specified credit limit. We follow Fricke, Greppmair, and Paludkiewicz (2024) and limit the sample to these types of instruments to ensure a reasonable level of homogeneity across the loans included in our analysis. Moreover, the three above-mentioned types of loans represent the majority of overall new loans issued to NFCs in all euro-area countries (between 65 percent and 99 percent of the new loans' value). As a robustness check, we exclude revolving loans from our analysis. The maturity of these loans is inherently ambiguous, as borrowers can draw on the credit line and repay it as long as it remains open, making it challenging to align with our focus on well-defined loan maturities.

To ensure comparability across all countries in our sample, we exclude loan exposures below EUR 25,000, as some countries report these smaller exposures while others do not. Also, we limit the sample to loans with positive interest rates and exclude any loans not reported in AnaCredit within six months of their inception date. Harmonization of the data across countries comes at the price of a substantial decline in the number of observations for some countries, although coverage remains high in terms of the loan value. Additionally, we exclude syndicated loans and loans with multiple creditors, as AnaCredit only records euro-area credit institutions that are involved in syndicated loans, regardless of the reporting institution's role as lead arranger or agent. More detailed information on the structure of newly issued loans to NFCs in euro-area countries can be found in the appendix.[10]

The sample includes newly issued loans[11] from January 2022 to December 2023, capturing the post-pandemic period of monetary tightening. Unlike most previous studies, our sample covers banks from all euro-area countries except for Croatia, where AnaCredit data are only available starting from its euro-area accession in 2023. Table 1 presents the summary statistics for the new loans to NFCs included in our analysis.[12]

Our final sample consists of nearly 7 million newly issued loans from January 2022 to December 2023, encompassing data from 2,382 banks. Among all countries, France has the highest number of observations, contributing 26.2 percent of the total, followed by Germany with 22.8 percent and Spain with 20.7 percent. At the other end of the spectrum are Malta (0.03 percent), Latvia (0.04 percent), and Estonia (0.07 percent). The summary statistics reveal substantial variation across euro-area countries in several dimensions, including average loan size, maturity, and interest rates. These differences partially reflect the varying popularity of different loan types and the diverse sectoral and size composition of borrowers. One consistent feature across nearly all euro-area countries—except Luxembourg

[10] See Table A.1 and Figures A.1–A.3 in the appendix.

[11] Loans are considered newly issued in AnaCredit when all of the following conditions are met. First, the unique combination of creditor, debtor, and instrument identifiers appear in AnaCredit for the first time. Second, the loan has not been reissued or extended as part of a renegotiation. Third, the time between the reporting date and the instrument's inception date is no more than six months. This third condition ensures that loans extended far in the past are not classified as "newly issued" simply because they are reported late due to a borrower only recently exceeding the EUR 25,000 threshold. The findings in the following sections remain robust to changes in the time difference threshold.

[12] Several adjustments were made to address discrepancies in Malta's loan data reporting, particularly in distinguishing between fixed-rate and floating-rate loans. Loans were reclassified by analyzing observed interest rate changes over their lifespan, with single irregularities treated as reporting errors and corrected to align with the dominant behavior. For loans with insufficient data, classifications were inferred based on the lending bank's broader rate-setting practices, including its typical behavior with similar loans. Mixed-rate loans were evaluated for consistency; those showing a clear alignment with a specific rate type were reclassified, while others remained classified as mixed. Overall, any discrepancies in the reported frequency rate of adjustments were corrected to the actual rate adjustment frequency inferred from the data on outstanding loans.

Table 1. Summary Statistics for the Newly Issued Loans to NFCs in Euro-Area Countries, 2022–23

Country	Number of Loans	Total Value, Bill. of EUR	Number of Banks	Value of the Loan, Thsd. of EUR			Rate, Weighted Mean, %	Maturity, Weighted Mean, Years	Domestic, Share, %	
				Mean	Median	S.D.			Number	Status
AT	114,660	114.6	437	999.7	147.0	4,164.8	3.39	7.52	97.2	88.8
BE	301,076	138.4	44	459.5	95.6	2,559.2	3.66	3.51	98.8	89.8
CY	7,169	4.1	12	577.3	100.8	2,658.1	4.45	7.69	99.3	86.5
DE	1,580,626	511.9	861	323.9	42.0	8,189.1	3.57	3.48	98.8	92.3
EE	5,116	4.9	10	966.7	140.0	3,642.2	5.30	4.00	99.9	97.7
ES	1,436,303	309.8	127	215.7	54.3	5,821.2	3.53	3.38	99.7	98.0
FI	52,863	32.4	156	612.1	80.4	7,019.5	3.30	5.85	99.8	99.6
FR	1,815,906	484.6	175	266.9	50.0	4,164.2	3.07	7.01	99.9	97.5
GR	34,097	33.1	19	972.2	102.7	7,692.3	4.64	7.51	99.9	99.7
IE	50,165	40.5	19	806.5	56.3	5,974.1	3.94	3.54	80.9	47.4
IT	1,203,663	544.2	222	452.1	61.3	5,084.1	3.54	2.27	99.7	98.1
LT	8,892	5.6	19	629.0	80.6	3,814.6	4.95	5.20	99.9	96.4
LU	30,948	57.2	74	1,849.6	199.8	17,047.5	3.06	2.36	21.2	28.1
LV	2,835	2.6	14	900.7	125.0	3,694.8	4.79	4.03	99.1	94.1
MT	1,902	2.3	9	1,232.7	350.0	4,236.7	4.69	8.12	95.0	85.7
NL	53,807	93.1	29	1,729.7	200.0	9.272.3	3.68	7.86	94.7	69.4
PT	192,039	37.7	121	196.3	52.6	1,201.7	3.88	4.57	100.0	99.6
SI	17,209	9.0	15	522.3	100.0	1,905.1	3.46	3.49	99.0	97.9
SK	23,142	13.0	19	563.0	70.0	3,949.8	3.68	3.46	99.9	98.1
Euro Area	6,932,418	2,439.0	2,382	351.8	50.0	5,915.7	3.48	4.35	99.0	92.3

Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The first column represents the country of residence of the bank.

and, to a lesser extent, Ireland, Malta, and the Netherlands—is that the vast majority of loans are extended to domestic firms. This implies that country-specific institutional environments and lending practices could also contribute to differences in the transmission of monetary policy across euro-area countries.

2.2 Interest Rates on New Loans

In this section, we document differences in lending rates across euro-area countries. Figure 1 shows the mean interest rates on newly issued loans to NFCs, along with the one-standard-error band, for the first quarter of 2022 and the fourth quarter of 2023.[13] The first period captures the final quarter before post-pandemic rate hikes commenced in the euro area,[14] while the latter represents the first quarter following the final rate hike in the cycle. Between these two quarters, key monetary policy rates were raised by a cumulative 450 basis points. Rates were then maintained at peak levels for nine months before being lowered in June 2024.

Several noteworthy observations arise from Figure 1. First, there is considerable variation in lending rates across euro-area jurisdictions in both periods. In the first quarter of 2022, the difference between the highest mean interest rate (Malta, 3.55 percent) and the lowest (France, 1.18 percent) amounted to 237 basis points. This disparity had widened by the fourth quarter of 2023, with Estonia displaying the highest mean lending rate (7.52 percent) and Malta the lowest (4.54 percent).

Second, the relative position of countries within the lending rate distribution shifted notably between the two periods. For example, Malta moved from having the highest mean lending rate in the first quarter of 2022 to the lowest in the fourth quarter of 2023. Similar shifts, although less extreme, occurred among larger economies: the

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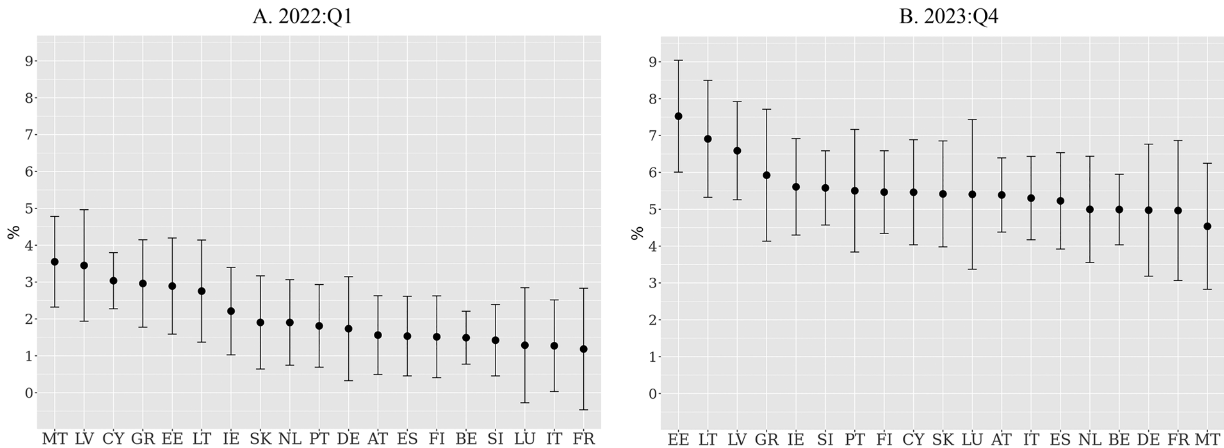
[13] Interest rates shown in Figure 1 are very similar to those obtained from the ECB, MFI Interest Rate Statistics (MIR).

[14] Although the initial rate increase occurred in July 2022, financial markets had largely anticipated this move by the second quarter of 2022. The first quarter of 2022 also marks the end of net asset purchases under the ECB's pandemic emergency purchase program (PEPP), which, however, had already been anticipated following the announcement in late 2021.

Figure 1. Interest Rates of the Newly Issued Loans to NFCs in Euro-Area Countries



Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The black dot denotes the weighted mean; the error bar represents +/− one weighted standard error. The horizontal axis represents the country of residence of the bank. The countries are arranged according to the weighted average level of interest rates.

Netherlands and Germany, initially around the middle of the distribution, ended up among the countries with the lowest rates by the latter period. Estonia saw the largest increase in mean lending rates, with a rise of more than 450 basis points, followed by Slovenia, Lithuania, Luxembourg, and Italy, each experiencing increases of around 400 basis points. Conversely, Malta saw a modest increase of 99 basis points, while Cyprus experienced a rise of 250 basis points. Greece, Germany, and the Netherlands showed similar increases, each close to 300 basis points. Such pronounced differences in lending rate changes underscore the need to explore why the recent episode of monetary tightening had such varied impacts on lending rates across countries within a single monetary union.

It is possible that cross-country differences in mean lending rates could be partially explained by structural differences. For example, it is possible that for some countries, the composition of the loan portfolio might be tilted more toward loans to large NFCs that tend to have lower interest rates. In order to account for cross-country differences in loan portfolio structure in terms of loan types, firm size classes, and maturities, we calculate the conditional mean interest rates.[15]

[15]Like in Kosekova et al. (2023), we use the following regression to compute the mean conditional interest rate ($\alpha_{1,c}$) for the euro-area countries:

$$r_{i,t}^{loan} = \sum_{c=1}^{19} \alpha_{1,c} \cdot D_c^{country} + \sum_{k=2}^{4} \alpha_{2,k} \cdot D_{k,i}^{size} + \sum_{s=2}^{21} \alpha_{3,s} \cdot D_{s,i}^{sector} + \sum_{l=2}^{3} \alpha_{4,l} \cdot D_{l,i}^{type} + \sum_{m=2}^{6} \alpha_{5,m} \cdot D_{m,i}^{maturity} + \alpha_6 \cdot D_i^{cross-border} + u_{i,t}.$$

The interest rate of loan i issued in period t was regressed on the set of dummies representing country c ($D_c^{country}$), firm size category k ($D_{k,i}^{size}$), macroeconomic sector s ($D_{s,i}^{sector}$), loan type l ($D_{l,i}^{type}$, credit lines, revolving credit, and other loans), and loan maturity category m ($D_{m,i}^{maturity}$). Dummy variable $D_i^{cross-border}$ equals one if loan i is a cross-border loan (the country of a bank does not coincide with the country of a firm, country c corresponds to the location of the bank). The regression is estimated by weighted least squares (WLS) for the new loans to NFCs issued in 2022:Q1 and 2023:Q4 separately, using loan values as weights. Figure A.4 in the appendix compares conditional and unconditional mean interest rates across countries for both the pre- and post-tightening periods, while Figure A.5 in the appendix shows the change in these rates between the two periods.

Consistent with the findings of Kosekova et al. (2023), our results reveal that adjusting for differences in firm size, sector, and loan type has a minimal effect on cross-country variation, indicating that such structural factors explain only a small portion of the lending rate differences across euro-area countries. Similarly, the changes in mean interest rates between the first quarter of 2022 and the fourth quarter of 2023 remain largely unaffected when comparing conditional and unconditional means.

These findings suggest that other loan characteristics—beyond those typically captured by borrower or loan type—may play a more significant role in explaining cross-country differences in lending rate levels and their responsiveness to monetary policy. One such dimension is the lending rate characteristics—in particular, the prevalence of fixed- versus floating-rate contracts and the maturity of the associated reference rates. These characteristics directly shape the sensitivity of lending rates to changes in monetary policy and can vary widely across countries.

2.3 Fixed- vs. Floating-Rate Loans and Other Rate Characteristics

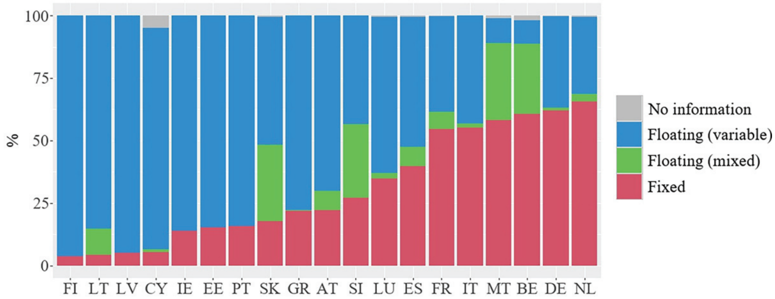
To explore this further, we leverage the unique granularity of AnaCredit data to document the cross-country differences in these lending rate characteristics to provide further context for the observed disparities in lending rate dynamics.

Figure 2 displays the composition of newly issued loans to NFCs, segmented by rate type: fixed, variable, and mixed. We treat variable- and mixed-rate loans as floating-rate loans.[16,17] A loan is considered to be a fixed-rate loan if it has an interest rate that

[16]According to the AnaCredit Manual, instruments that have both a fixed and a variable interest rate over their life are classified as mixed. Therefore, we treat mixed-rate loans as floating-rate loans in our analysis.

[17]If results on the structure of newly issued loans for a particular country contain information regarded as confidential according to the AnaCredit rules, the following adjustments are implemented in the published results. Random numbers are added to the share of all new loan categories within a given country, ensuring that the sum of all shares remains equal to 100 percent. These random numbers cannot be smaller than 1.5 percentage point or exceed 4 percentage points in absolute terms. If the share of a particular category is very small, an additional rule ensures that the share is adjusted at least twice, but by no more than

Figure 2. Structure of the Newly Issued Loans to NFCs by Rate-Type Categories in Euro-Area Countries, 2022–23



Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

remains constant over the entire duration of the loan. In turn, a loan is treated as a floating-rate loan if it has an interest rate that adjusts over time, typically linked to a defined reference rate. The prevalence of each rate type varies significantly across countries. For example, in Latvia, Lithuania, Finland, and Cyprus, floating-rate loans predominate, making up over 90 percent of new loans. Fixed-rate loans make up for only a minor share of new lending in these markets. Conversely, fixed-rate loans comprise nearly two-thirds of new loans to NFCs in the Netherlands, Belgium, and Germany. Other euro-area countries display a more balanced distribution between fixed- and floating-rate loans.

50 times in relative terms. This randomization procedure prevents the disclosure of confidential information while preserving overall trends in the results.

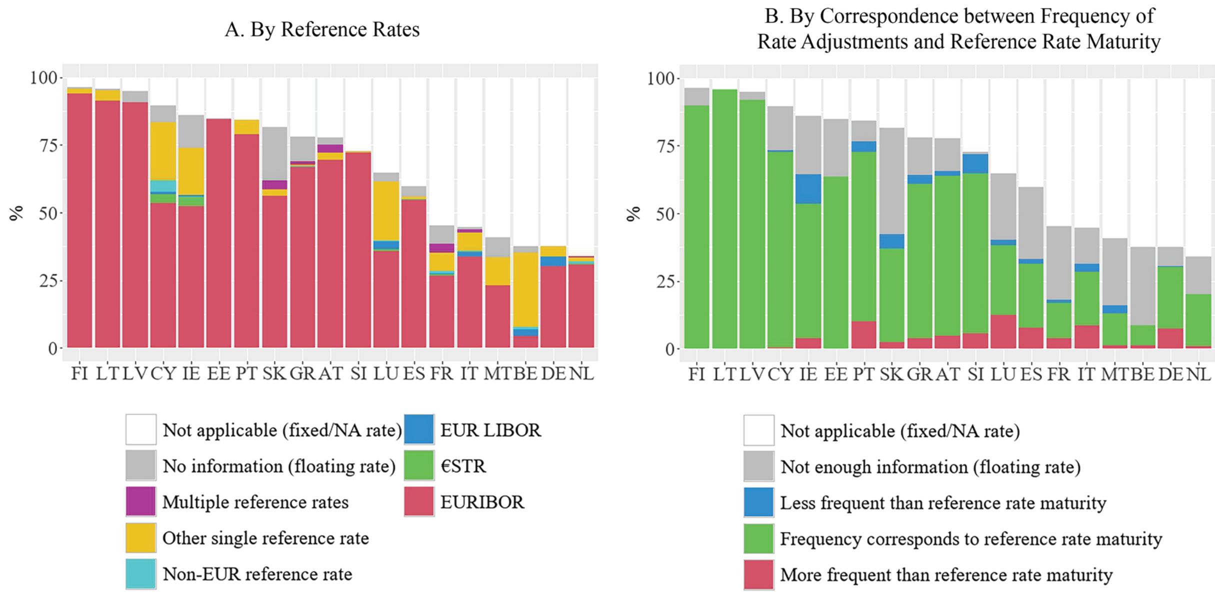
Moreover, within these two broad loan categories, there is substantial variation across several dimensions. For floating-rate loans, the reference rates used to benchmark lending rates differ notably among euro-area countries. While EURIBOR rates are the predominant benchmark in most countries (see Figure 3A), the choice of maturity varies significantly, ranging from overnight rates to 12-month rates (see Figure 4A). For example, Cyprus and Estonia both have a similar proportion of floating-rate loans, yet the specific reference rate maturities differ considerably. In Cyprus, over a third of loans are linked to a reference rate with a maturity of one month or less, and nearly three-quarters are benchmarked to a rate with a maturity of three months or less. In contrast, in Estonia, less than 10 percent of loans are based on reference rates of a month or less, with most floating-rate loans being linked to reference rates with maturities between three and six months.

Importantly, the frequency of interest rate adjustments for floating-rate loans generally aligns with the maturity of their reference rates (see Figure 3B). Consequently, countries with a higher share of floating-rate loans tied to reference rates with shorter maturities are likely to experience greater lending rate fluctuations than those where reference rates have longer maturities, even if the proportion of floating-rate loans is comparable.[18]

For fixed-rate loans, the interest rate is set for the entire duration of the loan, making their rate fixation period equal to loan maturity at origination. As shown in Figure 4B, the maturity structure of fixed-rate loans exhibits substantial heterogeneity across euro-area countries. France and Italy illustrate this contrast well: in both countries, fixed-rate loans comprise over half of all loans to NFCs, yet the typical maturity at origination differs markedly. In Italy, most fixed-rate loans have a maturity of 1 year or less, while in France, the majority have maturities exceeding 5 years, with many extending beyond 10 years. Consequently, the shorter maturities for

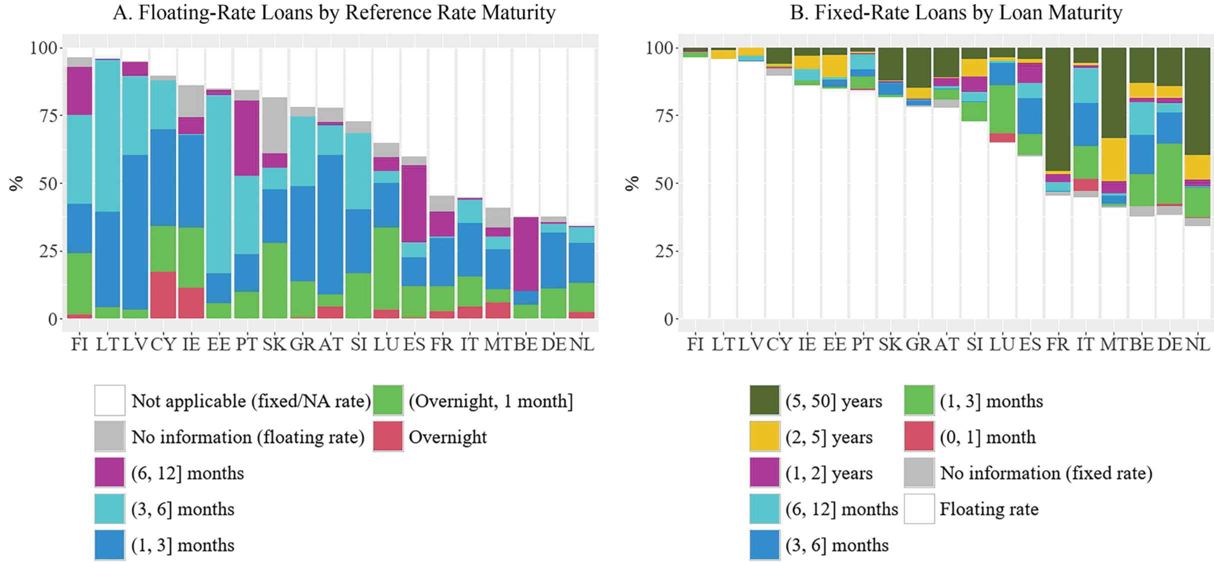
[18] To address concerns that monetary policy might influence banks' preferences for certain loan types or interest rate structures, as suggested by Gambacorta (2009) and Takaoka and Takahashi (2022), we compare the structure of newly issued loans to NFCs between 2022:Q1 and 2023:Q4. Figures A.6–A.9 in the appendix reveal that the composition of loan types within each country remains highly stable over time, as does the cross-country variation, suggesting minimal impact of monetary policy on these structural preferences.

Figure 3. Structure of the Newly Issued Loans to NFCs by Euro-Area Countries, 2022–23



Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure 4. Structure of the Newly Issued Floating-Rate Loans to NFCs by Euro-Area Countries, 2022–23



Source: AnaCredit.

Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

fixed-rate loans in Italy mean that NFCs face more frequent refinancing, leaving them more vulnerable to fluctuations in lending rates.

In summary, a simple distinction between fixed- and floating-rate loans overlooks significant variation in the reference rates used for pricing loans to NFCs across the euro area. Given that monetary policy impacts risk-free rates differently depending on their maturity (and therefore also the reference rates used for pricing loans), a binary classification of loans may not fully capture the sensitivity of loan interest rates to changes in monetary policy rates. To address this, we develop a loan-level measure of interest rate exposure based on the maturity of the relevant risk-free rate.

2.4 Obtaining the Relevant Risk-Free Rate and Premium

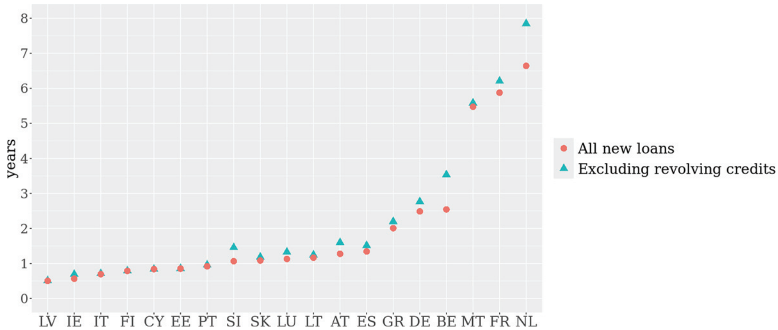
This section details our approach to identifying the relevant risk-free rate for each loan. We start by decomposing the interest rate ($r_{i,t}^{loan}$) on each loan i into two components: the relevant risk-free rate ($r_{i,t}^{risk-free}$) at the time of issuance and the corresponding premium ($r_{i,t}^{premium}$).

$$r_{i,t}^{loan} = r_{i,t}^{risk-free} + r_{i,t}^{premium}$$

For fixed-rate loans, the relevant risk-free rate is the OIS rate matched to the loan's maturity at the issuance date. For floating-rate loans, the relevant risk-free rate is the OIS rate matching the reference rate's maturity at the time of issuance, which, by definition, is shorter than the loan maturity. For example, the relevant risk-free rate for a five-year fixed-rate loan is the five-year OIS rate on the issuance date. In contrast, for a five-year floating-rate loan which has an interest rate benchmarked against a three-month EURIBOR and adjusted every three months, the relevant risk-free rate would be the three-month OIS rate. The premium is then calculated as the difference between the lending rate and the relevant risk-free rate.

The maturity of the relevant risk-free rate indicates which segment of the risk-free rate yield curve is relevant for determining the loan's interest rate. Figure 5 displays the weighted average maturity of the relevant risk-free rates for new loans to NFCs in euro-area countries.

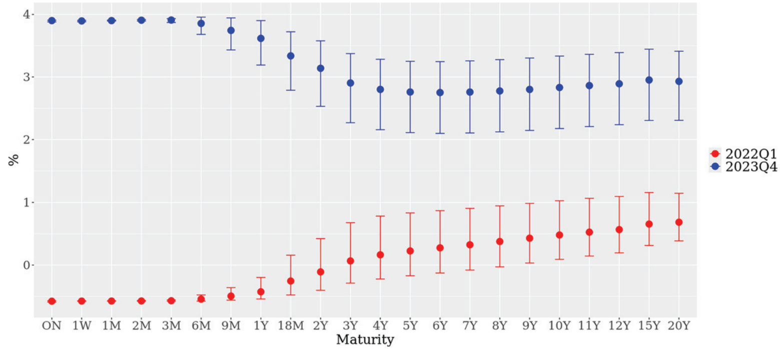
Figure 5. Weighted Average Maturity of the Relevant Risk-Free Rate for the Newly Issued Loans of NFCs in Euro-Area Countries, 2022–23



Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the weighted average maturity of the relevant risk-free rate.

At least two important observations can be made. First, there is significant variation across countries, with relevant risk-free rate maturities ranging from approximately 6 months in Latvia and Ireland to over 6.5 years in the Netherlands. Three countries—Malta, France, and the Netherlands—clearly stand out with the highest maturity of the relevant risk-free rates, which is largely due to the relatively high share of fixed-rate loans with longer maturities. These substantial differences in the maturities of the relevant risk-free rates could be one of the reasons for the cross-country variation in the extent to which lending rates changed during the post-pandemic episode of monetary tightening in the euro area. This is illustrated by comparing the OIS curve from the first quarter of 2022 with that of the fourth quarter of 2023 (see Figure 6). During this period, shorter-term OIS rates, such as the six-month rate—which reflects the average relevant risk-free rates in Latvia and Ireland—rose by approximately 440 basis points. In

Figure 6. OIS (risk-free) Rates in 2022:Q1 and 2023:Q4



Source: ECB Statistical Data Warehouse.
Note: Dots denote the average level of the OIS rate during the respective period, while bars indicate the minimum and maximum value of the rate.

contrast, OIS rates with maturities of five to seven years, which represent the average relevant risk-free rates in Malta, France, and the Netherlands, increased by only about 250 basis points.

Second, the average maturity of the relevant risk-free rates does not show a clear distinction between countries where fixed-rate loans predominate and those where floating-rate loans are more prevalent. For instance, countries with the shortest average maturity of relevant risk-free rates include Latvia, Ireland, and Cyprus, where floating-rate loans with frequent rate resets are common, as well as Italy, where fixed-rate loans predominate but tend to have shorter maturities. This observation aligns well with Gürkaynak, Karasoy-Can, and Lee (2022), who argue that fixed-rate loans with short maturities are of a very similar nature to floating-rate loans. A further illustration is Spain, where the average maturity of the relevant risk-free rates is significantly shorter than in Greece, despite fixed-rate loans being nearly twice as common. Both of the facts mentioned above remain unchanged when revolving loans are excluded from the sample.

In the following analysis, we empirically address two key questions: (i) To what extent can the cross-country variation in the rise of average interest rates on new loans between early 2022 and late 2023 be explained by differences in the evolution of relevant risk-free rates used to price NFC loans? (ii) How is the pass-through of monetary policy rate changes to interest rates on new loans affected by the maturity of the relevant risk-free rate?

3. Analysis

3.1 Before-and-After Analysis of Lending Rates: Cross-Country Variation

We begin the econometric analysis by examining whether differences in lending practices help to explain the variation in how lending rates adjusted across euro-area countries during the post-pandemic episode of monetary tightening. As shown in the previous sections, lending practices differ significantly across countries in terms of the prevalence of fixed- versus floating-rate loans, loan maturities, reference rates and their maturities, and the frequency of interest rate adjustments. These differences expose borrowers to risk-free rates of varying maturities, suggesting that the impact of rising short-term monetary policy rates may not have been felt uniformly across the euro area.

To conduct this analysis, we use loan-level data on all newly issued loans to NFCs from AnaCredit, which offers significant advantages, such as providing detailed information on contract-specific characteristics at the most granular level.[19] We employ a time-difference approach to analyzing changes in interest rate levels (Bredl 2025). In particular, we compare the rates of new loans issued in the

[19]However, using this data presents a notable limitation: the absence of a panel structure, as each newly issued loan represents a unique contract. Potentially, one may address this limitation by aggregating loan data to the bank-firm level across different credit instrument types similar to Behn, Forletta, and Reghezza (2024) or Coulier, Pancaro, and Reghezza (2024). This method does not work well for newly issued loans, however. It focuses exclusively on loans repeatedly issued by bank a to firm b, which substantially reduces the sample size (especially given the short time period covered by the AnaCredit data set), and introduces a bias toward large firms. Furthermore, even within the same bank-firm pair, loans can vary in key characteristics such as maturity and collateral value. One can aggregate new loans further across broader dimensions, such as countries, sectors, regions, or banks. While this method restores the time dimension, it is often less effective for conducting analysis in smaller euro-area countries. Limited observations in these cases often necessitate aggregation at the country level or similarly broad categories, which sacrifices the granularity of the data set.

first quarter of 2022 (2022:Q1) to those issued in the fourth quarter of 2023 (2023:Q4). This time frame captures the period before the first rate hike of the post-pandemic monetary policy tightening in July 2022 and following the final rate hike in September 2023. The time-difference regression is specified as follows:

$$\begin{bmatrix} r^{loan}_{i,t\in 2022Q1} \\ r^{loan}_{i,t\in 2023Q4} \end{bmatrix} = \beta_0^{loan} \cdot D_c^{country} + \beta_{1,c}^{loan} \cdot D_c^{country} \cdot \begin{bmatrix} 0 \\ 1 \end{bmatrix} + \sum_j \gamma_j^{loan} \cdot X_{i,t}^j + u_{i,t}. \quad (1)$$

Variable $r^{loan}_{i,t}$ refers to the interest rate of a new loan i issued in period t. Period t corresponds to the inception date of the loan.[20] The regression sample includes loans issued during 2022:Q1 ($t \in 2022Q1$) and those issued during 2023:Q4 ($t \in 2023Q4$). We allow interest rate levels to differ across countries by including a country-specific dummy $D_c^{country}$ (representing the country of residence of the bank). Furthermore, the interest rate levels are regressed on a dummy variable that equals zero for loans issued in the first period and one for loans issued in the second period. To capture cross-country variation in the extent to which lending rates changed, this dummy variable is interacted with $D_c^{country}$ (note that it is not necessary to include the period dummy separately, as no country is omitted in $D_c^{country}$). The coefficient of interest $\beta_{1,c}^{loan}$ represents the

[20]We implicitly assume that the creditor and debtor agree on the loan rate at the inception date. However, actual practices may deviate from this assumption. First, both parties can set the rate prior to the inception date. Unfortunately, AnaCredit does not provide information to identify such cases, particularly for fixed-rate loans. Second, the rate can be set after the inception date. AnaCredit contains the settlement date for most instruments. On average, loans are settled two weeks after their inception, although the average lag varies across countries, ranging from 0 to 38 days. Even under the extreme assumption that interest rates are set at the settlement date for all newly issued loans, our findings remain qualitatively unchanged. Finally, bias may arise due to the gap between the inception and reference (reporting) dates. We expect this bias to be negligible, as our sample is restricted to loans reported in AnaCredit within six months of their inception. Moreover, approximately 75 percent of newly issued loans first appear in AnaCredit within the same month or the following month of their inception. Using the reference date instead of the inception date to redefine the loan of the newly issued rate, the risk-free rate, and premium at the inception date does not qualitatively alter our findings. Supporting results are available upon request.

difference in interest rates for new loans issued before and after the monetary tightening in each country.

Changes in monetary policy rates were not the only factor influencing lending rates during the sample period. To address this, we leverage the granularity of our data set and include an extensive set of loan-level control variables $X^j_{i,t}$. Specifically, it includes a rich set of fixed effects to account for the characteristics of creditors (bank-level fixed effects), debtors (macroeconomic sector, region, and firm size fixed effects), and loan instruments (fixed effects for loan type, maturity, collateral size, reference rate type, reference rate maturity, rate adjustment frequency, multidebtor loans, cross-border loans). The large set of fixed effects is necessary to control for differences in lending rate levels across countries, macroeconomic sectors, regions, and firm sizes. Furthermore, systematic differences in lending rates are likely to exist between fixed-rate and floating-rate loans, between loans linked to the six-month EURIBOR and those linked to the three-month EURIBOR, and among other contract variations. Most of the fixed effects are interacted with country fixed effects[21] to capture country specificity of sectoral, firm size, or contract factors. However, there is no need to include time fixed effects in this specification, as the analysis considers only two time periods. By including all the above-mentioned fixed effects simultaneously, we ensure that we compare similar loans in 2022:Q1 and 2023:Q4 in terms of creditor, debtor, and contract features. Additionally, to account for changes in credit risk, we include the loan-level information on the probability of default.[22] Equation (1) is estimated by WLS, where weights are determined by the loan values.

[21]We use the bank country of residence. The only exception is the interaction with the sector of activity, where the firm country of residence is used to capture the demand effect.

[22]AnaCredit provides information on the probability of default (PD) for individual loans at the time of issuance. However, coverage of this variable is incomplete (or even absent for some countries), as PD data is not required from all entities (see the AnaCredit Manual). To address this limitation, we impute missing PD values using a model that predicts PD based on the ratio of the accumulated impairment amount to the loan value, while controlling for loan maturity, firm size, macroeconomic sector, and collateral size fixed effects. Details on the country-level variation in PD coverage after imputation and the quality of the imputation (measured as the correlation between actual and predicted PD values) are presented in Table A.2 in the appendix.

The results obtained from Equation (1) should not be interpreted as causal or used to directly quantify the pass-through of monetary policy rates to lending rates in the euro-area countries. This is because the policy rate changes between 2022:Q1 and 2023:Q4 were neither exogenous nor entirely unexpected. Economic agents had anticipated the tightening to some extent even before 2022. Moreover, the onset of the war in Ukraine in February 2022, along with the associated rise in uncertainty and energy price shocks, influenced expectations. Nevertheless, the before-and-after comparison offers valuable insights into cross-country differences in lending rate responses over the longer term, as the expectations regarding monetary policy changes were likely shared by agents across all countries within the monetary union.

Equation (1) can also be applied to the components of the interest rate: the relevant risk-free rate ($r_{i,t}^{risk-free}$) and the premium ($r_{i,t}^{premium}$). Since the sample and the set of right-hand-side variables remain unchanged, the estimated conditional change in new loan rates can be decomposed into two parts: the change driven by adjustments in the relevant risk-free rates (Equation (2)) and the change attributable to shifts in the premium (Equation (3)): $\beta_{1,c}^{loan} = \beta_{1,c}^{risk-free} + \beta_{1,c}^{premium}$.

$$\begin{bmatrix} r_{i,t\in 2022Q1}^{risk-free} \\ r_{i,t\in 2023Q4}^{risk-free} \end{bmatrix} = \beta_0^{risk-free} \cdot D_c^{country} + \beta_{1,c}^{risk-free} \cdot D_c^{country} \cdot \begin{bmatrix} 0 \\ 1 \end{bmatrix} + \sum_j \gamma_j^{risk-free} \cdot X_{i,t}^j + u_{i,t}^{risk-free} \tag{2}$$

$$\begin{bmatrix} r_{i,t\in 2022Q1}^{premium} \\ r_{i,t\in 2023Q4}^{premium} \end{bmatrix} = \beta_0^{premium} \cdot D_c^{country} + \beta_{1,c}^{premium} \cdot D_c^{country} \cdot \begin{bmatrix} 0 \\ 1 \end{bmatrix} + \sum_j \gamma_j^{premium} \cdot X_{i,t}^j + u_{i,t}^{premium} \tag{3}$$

The coefficient $\beta_{1,c}^{risk-free}$ captures the extent to which lending rates in country c changed due to shifts in the underlying risk-free rates that are relevant for loan pricing. Cross-country variation in this coefficient arises solely from differences in the maturities of the relevant risk-free rates. It is likely to be larger in countries where short-term risk-free rates predominate, driven by a higher prevalence of floating-rate loans with shorter reference rate maturities or a greater share of fixed-rate loans with shorter maturities. The coefficient $\beta_{1,c}^{premium}$ captures changes in lending rates driven by factors other than adjustments in risk-free rates.

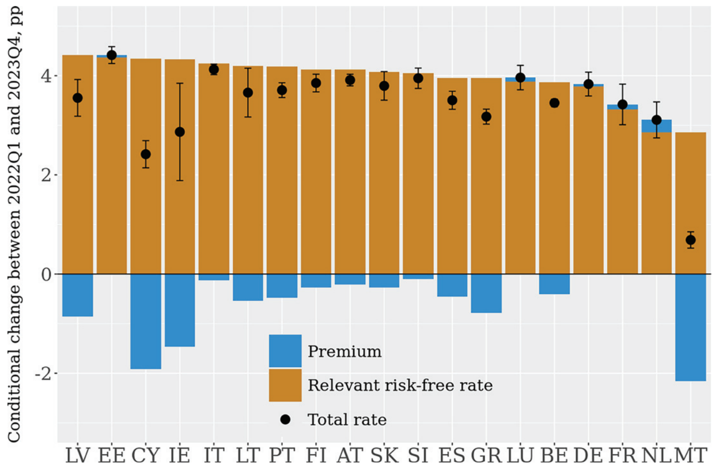
Figure 7 displays the estimated coefficients, $\beta_{1,c}^{loan}$ (shown as dots), derived from Equation (1) for each euro-area country. It also provides a decomposition of the total changes in lending rates into two key components: adjustments in the relevant risk-free rates and shifts in the premium, as outlined in Equations (2) and (3).

Consistent with the previous literature (e.g., Beyer 2024; Sørensen and Werner 2006), the estimated coefficients exhibit notable variation across euro-area countries. In 10 out of 19 countries, the coefficients fall within a relatively narrow range of 3.5 to 4.0 percentage points (pp) in conditional change between 2022:Q1 and 2023:Q4. However, some countries deviate significantly from this range. The lowest coefficients are found in Malta (0.69 pp), Cyprus (2.42 pp), Ireland (2.87 pp), and the Netherlands (3.11 pp), indicating relatively subdued adjustments in lending rates. In contrast, the highest conditional changes are observed in Estonia (4.42 pp) and Italy (4.13 pp), where lending rates responded more sharply. Across all euro-area countries, the increase in relevant risk-free rates was the primary driver of rising lending rates.[23] In fact, in many cases, lending rate changes closely mirrored the adjustments in underlying risk-free rates.

Additionally, three key observations emerge from the analysis. First, the contribution of risk-free rates to lending rate changes exhibits notable cross-country variation. Eleven countries experienced an increase in relevant risk-free rates exceeding 4 pp, with Latvia and Estonia experiencing the highest increases at 4.37–4.41 pp. In contrast, the Netherlands and Malta saw risk-free rates rise by only 2.85 pp, while France recorded an increase of 3.33 pp. These differences stem only from the varying maturities of the risk-free

[23] Accounting for the heterogeneity in relevant risk-free rate changes across countries helps to explain the cross-country heterogeneity in conditional changes in the rates for new loans. The weighted sum of squares mean deviation in overall lending rate changes across countries equals 0.11, while a similar metric for the premium is 0.07.

Figure 7. Decomposition of Conditional Changes in the Rates of the Newly Issued Loans to NFCs between 2022:Q1 and 2023:Q4



Source: AnaCredit.
Note: Point depicts the estimated country-specific coefficient $\beta_{1,c}^{loan}$ from Equation (1) that shows the difference in interest rates of new loans issued before and after the monetary tightening and the 95 percent confidence bands. The brown bar is the contribution of changes in the risk-free rate $\beta_{1,c}^{risk-free}$, and the blue bar is the contribution of changes in the premium $\beta_{1,c}^{premium}$. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the contribution of the relevant risk-free rate.

rates relevant for each country, as all euro-area members share the same underlying risk-free rates (OIS rates).

Second, the distinction between fixed- and floating-rate loans does not always provide a clear explanation for the observed patterns. For instance, the contribution of relevant risk-free rates was particularly pronounced in countries like Latvia and Ireland, where floating-rate loans with short fixation periods are more prevalent.

Similarly, a strong contribution of risk-free rates was observed in Italy, despite its higher reliance on fixed-rate loans, as these loans tend to have shorter maturities.

Third, a large increase in the relevant risk-free rates does not necessarily result in the largest increases in lending rates. In several countries, the rise in relevant risk-free rates was offset by a decline in the premium, which moderated the overall increase in lending rates. Apart from Malta, this compensatory effect was particularly evident in countries like Cyprus, Ireland, and Latvia, where the relevant risk-free rates have very short maturities. This suggests that changes in the premium can play a significant role in shaping the total lending rate adjustments.

3.2 Variation in Lending Rate Changes during Post-Pandemic Tightening: The Role of Loan Characteristics

Equations (1)–(3) provide valuable insights into the factors underlying cross-country variation in how lending rates adjusted during the post-pandemic episode of monetary policy tightening. However, these equations do not address whether lending rates responded differently across various types of loans. To investigate whether changes in lending rates were influenced by the maturity of the relevant risk-free rate, we extend the framework of Equations (1)–(3), replacing the country-specific dummies with various loan-level indicators describing contract features primarily focusing on the maturity of the relevant risk-free rate (see Equation (4)).

$$\begin{bmatrix} r_{i,t\in 2022Q1} \\ r_{i,t\in 2023Q4} \end{bmatrix} = \beta_0 + \left(\delta_0 + \sum_k \delta_{1,k} \cdot Z_{i,t}^k + \sum_m \delta_{2,m} \cdot W_{i,t}^m \right) \cdot \begin{bmatrix} 0 \\ 1 \end{bmatrix} + \sum_j \gamma_j \cdot X_{i,t}^j + u_{i,t} \tag{4}$$

$Z_{i,t}^k$ includes a set of dummies representing the maturity buckets of the relevant risk-free rate associated with loan i issued in period t. These buckets are as follows: relevant risk-free rate maturity up to 1 month; 1 to 3 months; 3 to 6 months; 6 to 12 months; 1 to 2 years; 2 to 5 years.[24] The loans with the relevant risk-free rate above five years serve as a benchmark (omitted category). This approach allows us to assess whether lending rate adjustments differ based on the maturity of the relevant risk-free rate. The set of dummies $W_{i,t}^{m}$ represents other contract features of the loan that are potentially important in explaining the lending rate changes between 2022:Q1 and 2023:Q4; in particular, we include a dummy variable that distinguishes between fixed- and floating-rate loans. In addition, $W_{i,t}^{m}$ includes two dummies indicating loans in which the frequency of interest rate adjustments differs from the maturity of the reference rate (higher and lower frequency, correspondingly). We also allow for different lending rate changes in cases where the reference rate is not EUR-related, where there are multiple reference rates, or cases where the reference rate is any other single rate (EURIBOR; ESTR, or euro short-term rate; and EUR LIBOR, or London interbank offered rate, serve as benchmarks). Finally, $W_{i,t}^{m}$ accounts for the potential difference in rate changes for the cross-border loans. As before, $X_{i,t}^{j}$ stands for the large set of variables controlling for the level of lending rates. Note that all contract features captured by $Z_{i,t}^{k}$ and $W_{i,t}^{m}$ are also included into $X_{i,t}^{j}$.[25] Similarly to Equations (1)–(3), we perform the analysis for the total lending rate and the two subcomponents: the relevant risk-free rate and the premium, thus $r_{i,t}$ represents $r_{i,t}^{loan}$, $r_{i,t}^{risk-free}$, or $r_{i,t}^{premium}$.

We therefore proceed to investigate whether lending rate adjustments and factors driving them differ based on the maturity of the relevant risk-free rate. Table 2 presents the estimated coefficients from the regression analysis specified in Equation (4).[26]

[24]The upper bound is included in each bucket, while the lower bound is only included in the first bucket.

[25]Although $X_{i,t}^{j}$ includes the relevant risk-free rate maturity × country fixed effects, we still can estimate the coefficient $\delta_{1,k}$ because of the lending rate variation between 2022:Q1 and 2023:Q4 for the same country and relevant risk-free rate maturity.

[26]Table A.3 in the appendix provides the information about the share of outliers. For each euro-area country we exclude very large newly issued loans: top 0.1 percent, or 10 top loans, whichever measure has the highest number of observations. Also, we exclude new loans with interest rates exceeding the top 1 percentile of the distribution in the respective country. Table A.4 in the appendix reports the share of observations with missing information. The value share of observations with missing information is substantial, averaging around

Table 2. Regression Results for Conditional Change in Total Rate, Relevant Risk-Free Rate, and Premium between 2022:Q1 and 2023:Q4

Variables	**Total Rate** (1)	**Relevant Risk-Free Rate** (2)	**Premium** (3)
Dummy for 2023:Q4 (D_{2023Q4})	3.11***	2.45***	0.66***
	(0.05)	(0.02)	(0.04)
$D_{2023Q4} \times (0,1]$ Month Risk-Free Rate	1.01***	1.99***	–0.98***
	(0.16)	(0.03)	(0.15)
$D_{2023Q4} \times (1,3]$ Month Risk-Free Rate	0.92***	1.97***	–1.05***
	(0.13)	(0.03)	(0.12)
$D_{2023Q4} \times (3,6]$ Month Risk-Free Rate	0.80***	1.89***	–1.09***
	(0.12)	(0.03)	(0.11)
$D_{2023Q4} \times (6,12]$ Month Risk-Free Rate	0.73***	1.63***	–0.90***
	(0.09)	(0.04)	(0.09)
$D_{2023Q4} \times (1,2]$ Year Risk-Free Rate	0.36***	1.20***	–0.85***
	(0.08)	(0.03)	(0.08)
$D_{2023Q4} \times (2,5]$ Year Risk-Free Rate	0.17**	0.35***	–0.18**
	(0.06)	(0.02)	(0.06)
$D_{2023Q4} \times$ Floating Rate	0.00	0.07***	–0.07
	(0.14)	(0.02)	(0.14)
$D_{2023Q4} \times$ Adjustment More Frequent Than Reference Rate Maturity	0.10	0.00	0.09
	(0.19)	(0.02)	(0.19)
$D_{2023Q4} \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.07	–0.01	–0.06
	(0.24)	(0.03)	(0.23)
$D_{2023Q4} \times$ Non-EUR Reference Rate	0.26*	–0.04	0.30*
	(0.12)	(0.02)	(0.12)

(*continued*)

Table 2. (Continued)

Variables	Total Rate (1)	Relevant Risk-Free Rate (2)	Premium (3)
$D_{2023Q4} \times$ Other Single Reference Rate	–0.13	–0.02	–0.11
	(0.17)	(0.06)	(0.16)
$D_{2023Q4} \times$ Multiple Reference Rates	–0.28	–0.16*	–0.12
	(0.28)	(0.06)	(0.32)
$D_{2023Q4} \times$ Cross-Border Loans	–0.18	0.01	–0.18
	(0.14)	(0.02)	(0.15)
Probability of Default (Imputed if Missing)	9.50***	0.00	9.50***
	(1.12)	(0.07)	(1.12)
Fixed Effects: Creditor Country, Bank, Loan Type × Creditor Country, Debtor Sector × Debtor Country, Debtor Region, Firm Size Class × Creditor Country, Loan Maturity × Creditor Country, Collateral Size × Creditor Country, Cross-Border Loan × Creditor Country, Multi-debtor Loan × Creditor Country, Reference Rate Type × Creditor Country, Risk-Free Rate Maturity × Creditor Country, Reference Rate Adjustment Frequency × Creditor Country			
Number of Observations	1,133,053	1,133,053	1,133,053
R^2	0.85	0.99	0.46
Within R^2	0.78	0.98	0.09
Standard Errors Clustered by	Bank	Bank	Bank

Source: AnaCredit.

Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Results are obtained by WLS, where weights are determined by the loan values. D_{2023Q4} denotes a binary variable that equals one for 2023:Q4 and zero for 2022:Q1. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

The results indicate that interest rates increased between 2022:Q1 and 2023:Q4 for all loans, primarily driven by a notable rise in the relevant risk-free rates (column 2) and a smaller contribution from a change in the premium (column 3). However, the extent of the increase varies based on the maturity of the relevant risk-free rates, with more pronounced increases observed for loans tied to shorter maturities. For example, loans with relevant risk-free rate maturities of between two and five years experienced a 0.17 percentage point higher increase in interest rates compared with loans with relevant risk-free rate maturities exceeding five years. The estimated coefficients steadily rise as maturities shorten, with the highest coefficient (1.01) being observed for loans with relevant risk-free rate maturities of one month or less.

Interestingly, the coefficient for floating-rate loans is statistically insignificant. This indicates that the sensitivity of lending rates is not simply driven by whether a loan has a fixed or floating rate. Instead, it is influenced by a more nuanced set of factors that characterize the maturity of the relevant risk-free rate. Most other factors characterizing lending rates do not show a statistically significant effect on changes in lending rates. One exception is loans referenced to non-EUR reference rates, which experienced a more pronounced increase in lending rates.

It is important to note that the differences in lending rate changes are smaller than expected given the mechanical differences in risk-free rates. This is because loans linked to risk-free rates with shorter maturities saw premia decline more substantially. For instance, loans with risk-free rate maturities of one month or less saw a 0.98 percentage point greater reduction in premia compared with those with maturities exceeding five years. Consequently, although the relevant risk-free rates for these loans increased by 1.99 percentage points more, the differences in overall lending rate adjustments were less pronounced.

These results suggest that banks adjusted premia in a way that partially offset the increase in lending rates for loans most exposed to rising short-term risk-free rates. This behavior helped to smooth

35 percent. The highest shares of observations with missing data were recorded for Ireland, France, and Malta, which should be considered when interpreting the results.

cross-loan differences in lending rate changes that would have been larger if lending rates had moved purely in line with the relevant risk-free rates. To ensure that this finding is not driven solely by our choice of the "after" period and a particular configuration of the risk-free yield curve, we reestimate Equation (4) iteratively, varying the post-tightening period from 2023:Q4 to each quarter between 2022:Q2 and 2023:Q3. Our results indicate that the findings are robust to the choice of the "after" period. The smoothing role of the premium is evident throughout the sample period, as differences in lending rate adjustments consistently remain more muted than what would be expected based solely on changes in the underlying risk-free rates.[27]

There are at least two potential reasons why the adjustment in the premium may depend on the maturity of the relevant risk-free rate. First, we argue that such adjustments may be driven by bank-specific factors that vary over time. For example, banks issuing new loans tied to shorter-maturity risk-free rates (assuming consistent pricing with outstanding loans) were likely to experience a more substantial increase in net interest income, as their loan portfolios reprice more quickly in response to monetary policy changes than their funding costs, particularly deposits (see, for example, Altunok, Arslan, and Ongena 2023; Beyer 2024). As a result, deposit spreads may have been large enough to sustain or increase banks' profitability without the need for a high loan spread. This allowed banks

[27]See Table A.5 in the appendix. Importantly, the offsetting mechanism goes beyond what would simply emerge as a result of a constant incomplete pass-through. If the pass-through of the relevant risk-free rate was incomplete and constant over loan categories and time, offsetting would follow "mechanically." Imagine the pass-through was 0.8 for all loans. If the relevant risk-free rate increased by 4 percentage points, the lending rate would increase by 3.2 percentage points and the premium would decline by 0.8 percentage points. If the relevant risk-free rate for another loan category increased by 2 percentage points, lending rates in this category would increase by 1.6 percentage points and the premium would decline by 0.4 percentage points only. Hence, the premium for the category with a stronger increase in the relevant risk-free rate would "mechanically" decline more strongly. Our results suggest that the pass-through is time-varying and fosters the offsetting pattern. The pass-through for loans with relevant risk-free rate maturity exceeding five years was quite low in the second quarter 2022 (0.57/1.16=0.49) when relevant risk-free rates in this category had risen more than in other categories but quite strong in the fourth quarter 2023 (3.11/2.45=1.27) when relevant risk-free rates in this category had risen less than in other categories.

more exposed to short-term rates to benefit from stronger gains in net interest income compared with those relying more on longer-maturity benchmarks. The resulting additional income could have allowed them to reduce the premium—to gain market share, prevent a credit crunch, or support borrower resilience. To test whether the observed smoothing of lending rate changes is driven by time-varying bank heterogeneity, we reestimate Equation (4), this time including bank-period fixed effects. These fixed effects control for any variation in how individual banks were affected across the "before" and "after" period (see Table 3). Our results suggest that the smoothing effect of the premium does not disappear when bank-period fixed effects are included.

Alternatively, a premium may smooth out monetary-policy-induced increases in the risk-free rates due to "composition effects" from the supply side and the demand side. On the supply side, the literature suggests that financial institutions may change their risk-taking depending on the monetary policy conditions (e.g., Chodorow-Reich 2014). According to this view, increases in policy rates raise the hurdle rate for new investment projects, making it more costly or less feasible for projects with lower expected returns or higher variance (riskier projects) to secure external financing. Likewise, a higher interest rate environment may reduce banks' incentives to reach for yield or may increase their risk aversion. In our context, such behavior may lead banks to shift their lending portfolios toward relatively less risky borrowers than prior to the tightening cycle. If borrowers of loans with shorter-maturity risk-free rates are more sensitive to such reallocation—consistent with their higher rollover risks or credit spreads (e.g., Chen, Xu, and Yang 2021; Diamond 1991)—these loans may have experienced a relatively sharper decline in premium. Although we control for these possible compositional effects through the inclusion of loan-specific probabilities of default, we cannot rule out that our results may to some extent be driven by these supply-side shifts. From another perspective, as borrowers on short-term loans have flexibility to manage their leverage (e.g., Dangl and Zechner 2021), reaching, for example, for higher-maturity or fixed-rate loans amid rising reference rates, banks may narrow the spreads on new shorter-maturity loans relatively more to retain their investment returns or market shares. This should be more prevalent in less concentrated banking systems

Table 3. Regression Results for Conditional Change in Total Rate, Relevant Risk-Free Rate, and Premium between 2022:Q1 and 2023:Q4, Including Bank-Quarter Fixed Effects

Variables	**Total Rate**	**Relevant Risk-Free Rate**	**Premium**
	(1)	**(2)**	**(3)**
Dummy for 2023:Q4 (D_{2023Q4})	—	—	—
$D_{2023Q4} \times (0, 1]$ Month Risk-Free Rate	0.57***	1.81***	–1.24***
	(0.13)	(0.05)	(0.13)
$D_{2023Q4} \times (1, 3]$ Month Risk-Free Rate	0.78***	1.84***	–1.06***
	(0.10)	(0.04)	(0.09)
$D_{2023Q4} \times (3, 6]$ Month Risk-Free Rate	0.73***	1.76***	–1.03***
	(0.10)	(0.04)	(0.09)
$D_{2023Q4} \times (6, 12]$ Month Risk-Free Rate	0.73***	1.52***	–0.79***
	(0.10)	(0.05)	(0.10)
$D_{2023Q4} \times (1, 2]$ Year Risk-Free Rate	0.35***	1.13***	–0.78***
	(0.08)	(0.03)	(0.08)
$D_{2023Q4} \times (2, 5]$ Year Risk-Free Rate	0.21***	0.31***	–0.10
	(0.06)	(0.02)	(0.06)
$D_{2023Q4} \times$ Floating Rate	0.42***	0.16***	0.27**
	(0.09)	(0.03)	(0.10)
$D_{2023Q4} \times$ Adjustment More Frequent Than Reference Rate Maturity	–0.04	0.00	–0.03
	(0.09)	(0.02)	(0.10)
$D_{2023Q4} \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.04	0.01	–0.04
	(0.18)	(0.06)	(0.14)
$D_{2023Q4} \times$ Non-EUR Reference Rate	–0.20**	–0.05	–0.15
	(0.07)	(0.03)	(0.08)

(*continued*)

Table 3. (Continued)

Variables	Total Rate (1)	Relevant Risk-Free Rate (2)	Premium (3)
$D_{2023Q4} \times$ Other Single Reference Rate	–0.14	–0.13	–0.01
	(0.13)	(0.08)	(0.17)
$D_{2023Q4} \times$ Multiple Reference Rates	0.39	–0.16	0.55
	(0.83)	(0.10)	(0.92)
$D_{2023Q4} \times$ Cross-Border Loans	–0.22	0.00	–0.22
	(0.16)	(0.02)	(0.17)
Probability of Default (Imputed if Missing)	9.45***	–0.02	9.47***
	(1.09)	(0.06)	(1.10)
Fixed Effects: Creditor Country × Quarter, Bank × Quarter, Loan Type × Creditor Country, Debtor Sector × Debtor Country, Debtor Region, Firm Size Class × Creditor Country, Loan Maturity × Creditor Country, Collateral Size × Creditor Country, Cross-Border Loan × Creditor Country, Multidebtor Loan × Creditor Country, Reference Rate Type × Creditor Country, Risk-Free Rate Maturity × Creditor Country, Reference Rate Adjustment Frequency × Creditor Country			
Number of Observations	1,133,053	1,133,053	1,133,053
R^2	0.87	0.99	0.52
Within R^2	0.07	0.64	0.07
Standard Errors Clustered by	Bank	Bank	Bank

Source: AnaCredit.

Note: This table replicates results from Table 2 but with fixed effects at the bank-quarter level. As a consequence, the coefficient for D_{2023Q4} is no longer identified. *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Results are obtained by WLS, where weights are determined by the loan values. D_{2023Q4} denotes a binary variable that equals one for 2023:Q4 and zero for 2022:Q1. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

in which deposit spreads are likely to widen relatively less after rate hikes, in the spirit of Drechsler, Savov, and Schnabl (2017). These insights on the smoothing role of loan premia amid policy tightening point to an interesting interplay between the bank lending channel and the bank risk-taking channel and the market composition which has been largely unexplored.

Finally, on the demand side, one might argue that there might have been an "opportunistic" shift in borrower demand toward loan categories for which the increase in relevant risk-free rates was relatively lower. This demand shift then might have induced an increase in the premium in these categories relative to the categories that experienced a sharper increase in relevant risk-free rates. However, our data are not well suited to directly test these hypotheses, and we leave a more detailed investigation of these mechanisms to future research.

3.3 Pass-Through of Monetary Policy Rates to Lending Rates

We next turn to the following question: Does the pass-through of monetary policy rates to lending rates depend on the maturity of the relevant risk-free rates? Since this directly addresses the transmission of monetary policy, our empirical strategy must be adjusted in two key ways. First, we turn our attention to loans issued in close proximity to ECB GovC meetings and use stacked time-difference regression instead of a simple before-and-after comparison (see Bredl 2025).

In total, there were 15 ECB GovC meetings in 2022–23.[28] For each GovC meeting on date τ, we compare new loans issued within a six-week period before the meeting ($t \in [\tau - 6W, \tau)$) with those issued within a six-week period after the meeting ($t \in (\tau, \tau + 6W]$). Loans issued on the meeting date are excluded from both groups. The six-week windows were chosen because ECB GovC meetings typically occur at six-week intervals. This time frame ensures that, in most cases, only a single monetary policy event affects the loans in each

[28] Eight meetings in 2022: February 3, March 10, April 14, June 9, July 21, September 8, October 27, December 15. Seven meetings in 2023: February 2, March 16, May 4, June 15, July 27, September 14, October 26.

group.[29] We then combine the 15 sets of pre- and post-meeting loan data into a single data set and apply an approach similar to Equation (4). Now instead of the binary variable $[0,1]'$ that distinguishes the loans issued before and after post-pandemic monetary tightening, the regression includes the variable $[0,\Delta DF_\tau]'$ that compares the loans issued six weeks before ($t \in [\tau-6W,\tau)$) and six weeks after ($t \in (\tau,\tau+6W]$) the respective GovC meeting. ΔDF_τ stands for the policy change variable and serves as a continuous treatment, since we stack several monetary policy events into one regression. After controlling for an extensive set of variables ($X^j_{i,t}$), the difference between the lending rates of new loans issued before and after the meeting is driven by the announced policy changes. Interaction terms allow for the heterogeneous pass-through of monetary policy rates depending on individual loan characteristics ($Z^k_{i,t}$ and $W^m_{i,t}$):

$$\begin{bmatrix} r_{i,t\in[\tau-6W,\tau)} \\ r_{i,t\in(\tau,\tau+6W]} \end{bmatrix} = \beta_\tau + \left(\delta_0 + \sum_k \delta_{1,k}\cdot Z^k_{i,t} + \sum_m \delta_{2,m}\cdot W^m_{i,t}\right) \times \begin{bmatrix} 0 \\ \Delta DF_\tau \end{bmatrix} + \sum_j \gamma_j \cdot X^j_{i,t} + u_{i,t}, \tag{5}$$

where the coefficient β_τ represents a GovC meeting-specific intercept, accounting for differences in the level of loan rates around each monetary policy event. The set of controls and fixed effects is unchanged from the earlier specification. However, since Equation (5) analyzes numerous monetary policy decisions, all fixed effects are now interacted with the GovC meeting (period) fixed effects. These interactions ensure that all possible country, creditor, debtor, and contract characteristics surrounding each GovC meeting are controlled for. In other words, this approach ensures the comparability of new loans issued before and after each monetary policy decision.

The second adjustment to our methodology concerns the variable representing policy changes, now defined as the announced change in the deposit facility rate (ΔDF_τ) at date τ. Policy rate adjustments between July 2022 and September 2023 were not exogenous and were largely anticipated by economic agents. To address this, we

[29]It is important to note that many loans appear in the stacked regression twice: once in the "before" group and once in the "after" group.

follow the approach of Altavilla et al. (2022), estimate Equation (5) by two-stage least squares (TSLS), and instrument ΔDF_τ with monetary policy surprises, measured using high-frequency movements in asset prices around official policy announcements. These surprises are sourced from the Euro Area Monetary Policy Event-Study Database (Altavilla, Brugnolini et al. 2019), widely used in recent empirical research (e.g., Altavilla et al. 2023; Fungácová, Kerola, and Laine 2023). We employ two instruments simultaneously: target and timing surprises. Target surprise captures changes in short-term interest rates during the press release window, while timing surprise reflects market expectations for policy changes over the next few meetings, measured during the press conference window (Altavilla, Brugnolini et al. 2019). This approach aligns broadly with Altavilla et al. (2022), who use changes in OIS rates with maturities of up to three years as instruments. However, we exclude forward guidance surprises due to their weak correlation with changes in the deposit facility rate.[30] The relevance of the instruments is largely driven by the choice of the policy variable—the deposit facility rate. While forward guidance and quantitative easing (QE) surprises are important for loans with long relevant risk-free rate maturities, the inclusion of these surprises in the analysis requires a different sample period and different policy variable.

We instrument ΔDF_τ rather than directly including monetary surprises in Equation (5) for two reasons. First, this simplifies the interpretation of regression results, which now describe responses to an unexpected 1 percentage point change in the deposit facility rate. Second, using multiple monetary surprises as instruments enhances the reliability of our estimates. The coefficients of interest, $\delta_{1,k}$, estimate the extent to which the pass-through of unexpected changes in the deposit facility rate to lending rates varies across maturity buckets of the relevant risk-free rate ($Z^k_{i,t}$). Individual loan value weights are applied while estimating Equation (5). As before, we also decompose the total transmission to lending rates into transmission

[30]The correlation between changes in the deposit facility rate and the target surprise is 0.41 for 2022–23, and 0.45 for the timing surprise. In contrast, correlations with forward guidance and QE surprises are weaker at 0.13 and –0.23, respectively. Note that these correlations are based on only 15 GovC meetings during 2022–23, so they should be interpreted with caution.

to relevant risk-free rates and the premium, and $r_{i,t}$ represents $r_{i,t}^{loan}$, $r_{i,t}^{risk-free}$, or $r_{i,t}^{premium}$.

Equation (5) analyzes interest rate pass-through over a relatively short horizon (which we call $h = 1$ in the regression output tables). A period of six weeks following each GovC meeting may be insufficient to capture the full extent of the pass-through to lending rates. To examine longer-term responses to monetary policy surprises, we also estimate the effects over extended horizons: 7 to 12 weeks and 13 to 18 weeks post-monetary surprise. Specifically, we analyze new loans issued within the intervals $t \in (\tau + 6W, \tau + 12W]$ and $t \in (\tau + 12W, \tau + 18W]$, also referred to as $h = 2$ and $h = 3$, respectively.

Analyzing longer horizons of monetary transmission presents substantial challenges, as multiple GovC meetings may occur between the pre- and post-meeting periods for newly issued loans. Equation (5) attributes all changes in loan interest rates to the GovC meeting on date τ. This approach does not introduce bias over a long sample period, as monetary policy surprises—used as instruments for changes in deposit facility rates—are not autocorrelated. The absence of autocorrelation in monetary policy surprises is a natural phenomenon; market participants would detect any systematic patterns in monetary policy decisions and adjust their expectations accordingly. However, in very short samples (as is the case in this study), monetary surprises may appear to be autocorrelated, potentially leading to biased estimates of monetary transmission. This limitation should be considered when interpreting results over longer horizons.[31]

Table 4 shows the estimated coefficients from Equation (5). The pass-through from monetary policy rates to lending rates strengthens as the maturity of the relevant risk-free rates shortens. This effect becomes particularly pronounced over longer horizons (columns 1–3), i.e., when considering horizon $h = 2$ or $h = 3$ instead of our default horizon $h = 1$. The most substantial pass-through is observed for loans with risk-free rates of one month or less. For these loans, an unexpected 1 percentage point increase in the deposit facility

[31]The limited time dimension and data constraints in some cases are also the primary reasons why pass-through equations are not estimated separately for each country.

Table 4. Regression Results for the Pass-Through of Monetary Policy Rates to Lending Rates, Relevant Risk-Free Rate, and Premium

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Change in DF Rate (ΔDF Instrumented by Target and Timing Surprises)	0.17*	0.59***	0.37***	–0.21***	–0.17***	–0.65***	0.38***	0.76***	1.02***
	(0.08)	(0.14)	(0.10)	(0.02)	(0.02)	(0.02)	(0.09)	(0.13)	(0.11)
$\Delta DF \times (0, 1]$ Month Risk-Free Rate	0.33*	0.78**	1.47***	1.10***	1.5***	2.25***	–0.76***	–0.75**	–0.77**
	(0.14)	(0.25)	(0.23)	(0.05)	(0.06)	(0.07)	(0.14)	(0.27)	(0.26)
$\Delta DF \times (1, 3]$ Month Risk-Free Rate	0.19	0.65	1.24***	0.77***	1.21***	1.91***	–0.58***	–0.57	–0.67*
	(0.13)	(0.33)	(0.26)	(0.05)	(0.05)	(0.05)	(0.12)	(0.35)	(0.28)
$\Delta DF \times (3, 6]$ Month Risk-Free Rate	0.05	0.40**	0.98***	0.64***	1.06***	1.66***	–0.60***	–0.66***	–0.68***
	(0.11)	(0.14)	(0.13)	(0.04)	(0.03)	(0.05)	(0.12)	(0.15)	(1.15)
$\Delta DF \times (6, 12]$ Month Risk-Free Rate	0.22*	0.34	0.59**	0.56***	0.88***	1.35***	–0.34***	–0.54*	–0.76***
	(0.10)	(0.19)	(0.21)	(0.05)	(0.06)	(0.06)	(0.09)	(0.21)	(0.22)
$\Delta DF \times (1, 2]$ Year Risk-Free Rate	0.39*	0.13	0.63***	0.64***	0.89***	1.34***	–0.26	–0.76***	–0.71***
	(0.16)	(0.16)	(0.19)	(0.04)	(0.04)	(0.07)	(0.16)	(0.16)	(0.17)
$\Delta DF \times (2, 5]$ Year Risk-Free Rate	–0.10	–0.16	0.27*	0.18***	0.06*	0.53***	–0.27*	–0.22	–0.26*
	(0.11)	(0.19)	(0.11)	(0.03)	(0.03)	(0.04)	(0.12)	(0.19)	(0.12)
$\Delta DF \times$ Floating Rate	0.01	–0.37	–0.40	–0.13**	–0.11*	–0.09	0.15	–0.26	–0.32
	(0.11)	(0.24)	(0.23)	(0.05)	(0.05)	(0.09)	(0.09)	(0.27)	(0.27)
$\Delta DF \times$ Adjustment More Frequent Than Reference Rate Maturity	0.02	0.14	0.02	0.03	0.07*	–0.10	–0.01	0.07	0.12
	(0.09)	(0.13)	(0.18)	(0.03)	(0.03)	(0.08)	(0.08)	(0.13)	(0.22)
$\Delta DF \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.07	–0.09	0.23	0.03	0.03	0.10	–0.09	–0.12	0.13
	(0.21)	(0.26)	(0.28)	(0.06)	(0.07)	(0.11)	(0.20)	(0.28)	(0.27)
$\Delta DF \times$ Non-EUR Reference Rate	–0.15*	0.08	–0.11	0.11	0.09	0.17**	–0.26**	–0.010	–0.27*
	(0.06)	(0.09)	(0.10)	(0.06)	(0.06)	(0.06)	(0.09)	(0.08)	(0.11)

(continued)

Table 4. (Continued)

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
$\Delta DF \times$ Other Single Reference Rate	–0.08	–0.14	–0.35	–0.04	–0.03	–0.01	–0.05	–0.11	–0.34
	(0.10)	(0.16)	(0.20)	(0.06)	(0.07)	(0.09)	(0.11)	(0.20)	(0.22)
$\Delta DF \times$ Multiple Reference Rates	–0.42	–0.58	–0.17	0.26***	0.48**	0.43**	–0.69	–1.06**	–0.59
	(0.46)	(0.37)	(0.33)	(0.07)	(0.18)	(0.14)	(0.45)	(0.35)	(0.43)
$\Delta DF \times$ Cross-Border Loans	0.23	0.16	–0.13	0.05	0.07	0.11	0.18	0.09	–0.24
	(0.16)	(0.20)	(0.23)	(0.03)	(0.04)	(0.07)	(0.17)	(0.20)	(0.26)
Probability of Default (Imputed if Missing)	8.22***	8.12***	7.95***	0.01	–0.09	–0.16	8.21***	8.21***	8.11***
	(0.80)	(0.74)	(0.74)	(0.05)	(0.07)	(0.10)	(0.80)	(0.75)	(0.76)
Fixed Effects: GovC Period (τ) $\times$ Creditor Country, GovC Period (τ) $\times$ Bank, GovC Period (τ) $\times$ Loan Type $\times$ Creditor Country, GovC Period (τ) $\times$ Debtor Sector $\times$ Debtor Country, GovC Period (τ) $\times$ Debtor Region, GovC Period (τ) $\times$ Firm Size Class $\times$ Creditor Country, GovC Period (τ) $\times$ Loan Maturity $\times$ Creditor Country, GovC Period (τ) $\times$ Collateral Size $\times$ Creditor Country, GovC Period (τ) $\times$ Cross-Border Loan $\times$ Creditor Country, GovC Period (τ) $\times$ Multidebtor Loan $\times$ Creditor Country, GovC Period (τ) $\times$ Reference Rate Type $\times$ Creditor Country, GovC Period (τ) $\times$ Reference Rate Maturity $\times$ Creditor Country, GovC Period (τ) $\times$ Reference Rate Adjustment Frequency $\times$ Creditor Country									
Number of Observations	6,240,534	6,172,211	5,922,246	6,240,534	6,172,211	5,922,246	6,240,534	6,172,211	5,922,246
R^2	0.81	0.80	0.78	0.98	0.97	0.95	0.61	0.60	0.59
Within R^2	0.03	0.07	0.10	0.15	0.35	0.33	0.03	0.03	0.03
Standard Errors Clustered by	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

Source: AnaCredit.

Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022 and 2023, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Horizon $h = 1$ corresponds to the period of 6 weeks, $h = 2$ to 7–12 weeks, and $h = 3$ to 13–18 weeks following the Governing Council meeting. Results are obtained by weighted TSLS, where weights are determined by the loan values. Changes in the deposit facility rate are instrumented by target and timing surprises. ΔDF denotes changes in DF rate. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

rate results in a 1.473 percentage point larger rise in lending rates after 13–18 weeks compared with loans where the relevant risk-free rates have maturities exceeding five years. The pass-through becomes more muted for loans with progressively longer maturities of the relevant risk-free rates: 1 to 3 months (1.24), 3 to 6 months (0.98), 6 to 12 months (0.59), and 1 to 2 years (0.63).

The differences in the strength of pass-through are largely driven by how the risk-free rates relevant to each group of loans respond to monetary policy changes (columns 4–6). The estimated coefficients suggest that the pass-through of unexpected changes in monetary policy rates is significantly stronger for risk-free rates with shorter maturities. This reflects what can be considered the automatic component of pass-through, as shorter-maturity risk-free rates tend to adjust more directly and rapidly to shifts in policy rates.[32] Consequently, loans tied to these rates exhibit a more pronounced sensitivity to monetary policy surprises.

However, this mechanical pass-through is not the only factor at play, as adjustments in premia act to smooth differences in pass-through across loan categories. Loans linked to shorter-maturity risk-free rates also experienced a comparatively smaller increase in premia (columns 7–9), which partially offsets the differences in the aggregate pass-through to lending rates. For example, for loans that have risk-free rates with maturities of one month or less, an unexpected 1 percentage point increase in the deposit facility rate leads to a 2.25 percentage point larger rise in underlying risk-free rates compared with loans with relevant risk-free rates exceeding five years. However, the difference in pass-through to lending rates is more muted (1.47 percentage points), due to a more substantial increase in premia for loans with longer-term risk-free rates. Thus, while loans linked to shorter-maturity risk-free rates experience a more pronounced pass-through of monetary policy surprises, the effect is not purely mechanical.

[32]It is noteworthy that the estimated pass-through to short-term risk-free rates exceeds unity at longer horizons ($h = 2$ and $h = 3$). The regression coefficient captures the response of risk-free rates to an unexpected 1 percentage point change in the deposit facility rate. However, an unexpected increase in the deposit facility rate may signal additional changes that markets subsequently anticipate. This effect is particularly pronounced during our sample period, characterized by predominantly positive monetary surprises and a steady increase in policy rates.

Table 5. Interest Rate Pass-Through to Lending Rates from Unexpected 1 Percentage Point Increase in the Deposit Facility Rate, %

	$h = 1$	$h = 2$	$h = 3$
Existing Structure of New Loans	0.33	0.82	0.98
All New Loans Become Floating-Rate Loans with One-Month Reference Rate	0.52	1.01	1.42
Floating-Rate Loans Have One-Month Reference Rate, No Changes for Fixed-Rate Loans	0.38	0.91	1.13
All Floating-Rate Loans Become Fixed-Rate Loans, No Changes in Maturity	0.27	0.78	0.86

Source: AnaCredit.
Note: Horizon $h = 1$ corresponds to the period of 6 weeks, $h=2$ to 7–12 weeks, and $h=3$ to 13–18 weeks following the Governing Council meeting.

Other factors characterizing lending rates, such as a binary variable distinguishing between floating- and fixed-rate loans, do not exhibit a statistically significant effect on how monetary policy rate changes are passed through to lending rates. This underscores that the maturity of the relevant risk-free rate plays a pivotal role in explaining the variation in lending rate sensitivity to monetary policy changes, capturing much of the heterogeneity that a simple fixed-versus-floating classification fails to account for.

This variation in how loans are exposed to risk-free rates of different maturities has significant implications for the aggregate transmission of monetary policy. The first row of Table 5 shows that the estimated pass-through of an unexpected 1 percentage point increase in the deposit facility rate to lending rates is close to unity. However, this pass-through is approximately 30 percent weaker than it would be if all new loans were tied to risk-free rates with maturities of one month or less (e.g., if all loans were floating-rate loans linked to the one-month EURIBOR). Notably, even if only the floating-rate loans were indexed to a one-month reference rate, the pass-through would be about 15 percent stronger. Conversely, if all new loans had fixed interest rates for the entire loan duration, the pass-through would be approximately 13 percent weaker. From a monetary policy perspective, these results are important, as they reveal heterogeneity in the pass-through of monetary policy to lending rates that depends on how monetary policy affects the shape of the yield curve.

3.4 Robustness Checks

We perform several robustness checks of our findings, both for the analysis of conditional changes in rates of new loans before and after monetary policy tightening, and for the analysis of the pass-through of monetary policy rates to lending rates. Detailed results can be found in the appendix,[33] while here we discuss the design of the robustness checks and the key results. First, we acknowledge the specific nature of revolving credits. The fact that the maturity of revolving credits is inherently ambiguous provides additional challenges in defining the relevant risk-free rate. Thus, we check the robustness of our findings to the exclusion of revolving credits. Despite a notable reduction in the number of observations, regression results provide the same story, stressing the importance of the maturity of the relevant risk-free rate for new other loans and credit lines other than revolving credits. Also, the decomposition of the total rate changes by euro-area countries remains robust.

The period of 2022–23 saw a rapid increase in interest rates across the euro area, presenting additional challenges for estimating monetary policy transmission, even over short horizons. During the weeks leading up to each GovC date τ ($t \in [\tau - 6W, \tau)$), interest rates on new loans often exhibited significant fluctuations, rarely remaining stable. This raises the possibility that estimates of pass-through from monetary policy rates to lending rates might primarily reflect the continuation of pre-surprise trends rather than the actual effect of monetary policy measures. To address this issue, we perform a robustness check by incorporating changes in the six-month OIS rate during the "before" period (from $\tau - 6W$ to $\tau - 1$) into our regressions. This variable captures the potential continuation of preexisting trends in interest rates. To ensure that this adjustment is

[33]see Tables A.6–A.12 and Figure A.13 in the appendix.

appropriately applied, only new loans issued after the GovC meeting are influenced by this variable. Consequently, we include the term $\beta_2 \cdot [0, \quad \Delta r^{OIS6M}_{\tau-6W,\tau-1}]^T$ on the right-hand side of Equation (5). Note that while the baseline specification of Equation (5) tends to overestimate the monetary policy transmission in 2022–23, the adjusted specification underestimates it. More important in the context of our research is that the results still point to the crucial role of the maturity of the relevant risk-free rate.

We account for the possibility that loans labeled as fixed-rate loans in AnaCredit are actually floating-rate loans, but the period of rate fixation exceeds one year. Unfortunately, the AnaCredit database does not provide any information in this respect. In order to test the robustness of our results to the assumption that the relevant risk-free rate maturity coincides with a loan maturity, we use an alternative assumption: we assume that for the fixed-rate loans with maturity exceeding three years, the relevant risk-free rate is the three-year OIS rate. Regression results prove the robustness of our findings to this assumption.

Finally, we rerun the regressions excluding new loans with imputed probabilities of default. Despite the selection bias introduced—only certain banks that are required to report the probability of default to AnaCredit—regression results lead to the same conclusion, stressing the importance of the maturity of the relevant risk-free rate for transmission.

4. Conclusions

This study provides new insights into the heterogeneity of lending practices across euro-area countries and the implications it has for the transmission of monetary policy. Using granular loan-level data from AnaCredit, covering nearly 7 million new loans issued to NFCs in 2022–23, we document significant variation in the prevalence of fixed- and floating-rate loans, rate fixation periods, and reference rates used for pricing loans. These differences have important implications for how lending rates respond to changes in monetary policy.

To provide a deeper understanding of interest rate sensitivity, we introduce a nuanced measure based on the maturity of the relevant risk-free rate, which identifies the segment of the risk-free rate yield curve that influences a loan's interest rate. Our analysis reveals substantial cross-country variation in the average maturity of these relevant risk-free rates, ranging from approximately six months in countries like Latvia and Ireland to over five years in the Netherlands, Malta, and France.

Since monetary policy affects risk-free rates differently depending on their maturity, such disparities contribute to variations in how lending rates adjusted across euro-area economies during the post-pandemic episode of monetary tightening. Some of the smaller euro-area countries such as Latvia and Ireland, where floating-rate loans with short reference rate maturities predominate, and Italy, where fixed-rate loans with shorter maturities are prevalent, experienced larger increases in the relevant risk-free rates, leading to more pronounced rises in lending rates. In contrast, countries like the Netherlands and France, where longer-term risk-free rates play a significant role in loan pricing, observed more moderate adjustments in lending rates. Importantly, we found no systematic difference in lending rate changes for fixed- and floating-rate loans after accounting for the relevant risk-free rate. This indicates that the sensitivity of newly issued loan rates is not simply driven by whether a loan has a fixed a floating rate. Instead, it is influenced by a more nuanced set of factors that characterize the maturity of the relevant risk-free rate.

This study also shows that the pass-through of monetary policy changes to lending rates is strongest for loans linked to shorter-maturity risk-free rates, though this effect is not purely mechanical. Specifically, the increase in relevant risk-free rates for these loans is partially mitigated by a more muted rise in premia, compared with loans linked to longer-maturity reference rates. This behavior helped smooth cross-loan differences in lending rate adjustments that would have been more pronounced had lending rates moved solely in line with changes in the relevant risk-free rates. While the precise mechanisms underlying the differential adjustment in premia lie beyond the scope of this study, we demonstrate that this finding is robust to the choice of the sample period and is not driven by any particular configuration of the risk-free yield curve. Moreover, we show that the observed smoothing is not attributable to time-varying heterogeneity across banks, but rather reflects within-bank variation in loan pricing behavior.

Several potential explanations for these dynamics exist. One possibility is that premia smooth monetary-policy-induced increases in risk-free rates due to "composition effects" arising from both the supply and demand sides. On the supply side, financial institutions may adjust their risk-taking behavior in response to tighter monetary policy, shifting lending toward less risky borrowers. If borrowers of loans linked to shorter-maturity risk-free rates are more affected by such reallocation, these loans may have experienced a more pronounced decline in premia.

On the demand side, there may have been an opportunistic shift toward loan categories where the increase in the relevant risk-free rate was more moderate, placing upward pressure on premia in those segments. While we control for borrower risk through loan-specific probabilities of default, we cannot fully rule out the influence of such composition effects. Further research is needed to disentangle the relative contributions of these supply- and demand-side channels.

Overall, this study contributes to the literature by demonstrating how lending practices and the characteristics of loans can shape the effectiveness of monetary policy. Specifically, our findings illuminate how variations in lending practices drive cross-country differences in lending rate dynamics, offering a deeper understanding of the mechanisms underlying these divergences. Furthermore, our work opens avenues for further investigation into the drivers of cross-country heterogeneity in lending practices. While we document these differences and their implications, the underlying causes—whether rooted in institutional factors or firm- and bank-level characteristics—remain unexamined. Finally, our analysis focuses exclusively on the pass-through to interest rates on new loans, leaving the pass-through to interest rates on outstanding loans as a promising area for future research. We plan to address these questions in our future work.

Appendix. Additional Tables and Figures

Table A.1. Summary Statistics for Newly Issued Loans to NFCs by Euro-Area Country, 2022–23

Country	All Loans	. . . of Which Credit Lines, Revolving Credits, and Other Credits	. . . of Which Loans ≥25K, with a Positive Interest Rate, Reported within Six Months	. . . of Which Loans to NFCs Not in Financial and Insurance Sector and Nonsyndicated Loans	Loans Included in the Analysis	. . . as a Share of All Loans
Value of New Loans						
	Bill. of EUR	%	%	%	Bill. of EUR	%
AT	195.0	94.7	68.5	90.7	114.6	58.8
BE	350.0	97.0	49.8	81.8	138.4	39.5
CY	4.8	94.0	94.8	96.4	4.1	85.9
DE	975.2	87.2	72.1	83.5	511.9	52.5
EE	6.9	88.8	91.1	88.9	4.9	71.9
ES	611.9	80.4	73.3	85.9	309.8	50.6
FI	55.7	89.4	91.1	71.3	32.4	58.1
FR	1,935.5	79.1	41.2	76.8	484.6	25.0
GR	51.1	99.1	76.9	85.2	33.1	64.8
IE	184.4	90.0	34.9	69.8	40.5	21.9
IT	1,172.6	71.6	73.4	88.3	544.2	46.4
LT	9.3	71.9	92.9	90.3	5.6	60.3
LU	222.9	65.1	56.7	69.6	57.2	25.7
LV	3.6	84.1	88.4	94.7	2.6	70.4
MT	4.5	71.1	78.4	93.3	2.3	51.8
NL	234.2	83.6	58.1	81.9	93.1	39.7
PT	66.1	83.8	71.6	95.1	37.7	57.0
SI	14.4	81.5	91.0	84.4	9.0	62.6
SK	22.0	81.8	82.0	88.1	13.0	59.1

Table A.1. (Continued)

Country	All Loans	. . . of Which Credit Lines, Revolving Credits, and Other Credits	. . . of Which Loans ≥25K, with a Positive Interest Rate, Reported within Six Months	. . . of Which Loans to NFCs Not in Financial and Insurance Sector and Nonsyndicated Loans	Loans Included in the Analysis	. . . as a Share of All Loans
	Number of New Loans					
	Number	%	%	%	Number	%
AT	370,789	74.1	42.3	98.6	114,660	30.9
BE	927,843	76.6	44.5	95.2	301,076	32.4
CY	26,646	54.5	49.8	99.2	7,169	26.9
DE	5,233,584	75.0	40.7	98.8	1,580,626	30.2
EE	18,237	38.9	72.5	99.5	5,116	28.1
ES	9,469,269	49.3	31.0	99.3	1,436,303	15.2
FI	488,964	24.0	46.6	96.7	52,863	10.8
FR	8,588,863	51.6	42.1	97.2	1,815,906	21.1
GR	65,140	79.2	66.7	99.0	34,097	52.3
IE	229,090	61.8	36.7	96.6	50,165	21.9
IT	8,328,146	32.1	45.4	99.3	1,203,663	14.5
LT	43,405	35.1	58.8	99.2	8,892	20.5
LU	171,241	25.7	75.5	93.2	30,948	18.1
LV	9,125	36.8	84.7	99.6	2,835	31.1
MT	197,493	1.4	69.5	98.4	1,902	1.0
NL	341,831	91.3	18.1	95.3	53,807	15.7
PT	695,999	71.2	38.8	99.8	192,039	27.6
SI	147,704	22.8	51.7	99.0	17,209	11.7
SK	143,285	24.7	66.0	99.2	23,142	16.2

Source: AnaCredit.
Note: New loans to euro-area NFCs issued in 2022–23, denominated in EUR. The first column represents the country of residence of the bank.

Table A.2. PD and Imputed PD Data Availability for Newly Issued Loans to NFCs by Euro-Area Country, 2022–23

Country	Number of Observations	Total Value, Bill. of EUR	Coverage of PD after Imputation		Correlation, PD, and Imputed PD
			% of Number	% of Value	
AT	114,660	114.6	66.9	70.7	0.76
BE	301,076	138.4	91.0	89.2	0.38
CY	7,169	4.1	68.2	65.7	—
DE	1,580,626	511.9	57.3	79.8	0.27
EE	5,116	4.9	86.1	81.9	0.67
ES	1,436,303	309.8	66.4	72.5	0.42
FI	52,863	32.4	81.1	88.8	0.38
FR	1,815,906	484.6	93.4	83.6	0.63
GR	34,097	33.1	60.6	77.9	0.57
IE	50,165	40.5	70.3	58.5	0.37
IT	1,203,663	544.2	84.5	94.4	0.68
LT	8,892	5.6	73.2	81.8	0.70
LU	30,948	57.2	64.8	72.9	0.39
LV	2,835	2.6	89.1	88.7	0.69
MT	1,902	2.3	63.9	65.9	—
NL	53,807	93.1	94.1	70.7	0.55
PT	192,039	37.7	83.3	87.3	0.57
SI	17,209	9.0	88.3	76.8	0.81
SK	23,142	13.0	97.6	94.9	0.63

Source: AnaCredit.

Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The first column represents the country of residence of the bank.

Table A.3. Summary Statistics Before and After the Exclusion of Outliers, 2022:Q1 and 2023:Q4

Country	Number of Loans	Total Value, Bill. of EUR	Share of Outliers, % of Value	W. Mean Rate, %		W. Mean Maturity, Years		Value of the Loan, Thsd. of EUR	
				All Loans	Excl. Outliers	All Loans	Excl. Outliers	All Loans	Excl. Outliers
AT	28,182	28,774.3	9.6	3.2	3.2	7.8	8.0	1,021.0	933.1
BE	85,915	41,862.8	11.9	3.8	3.7	3.3	3.3	487.3	434.2
CY	1,849	942.9	20.3	4.2	4.4	7.3	6.7	509.9	413.9
DE	374,444	119,511.6	29.8	3.5	3.5	3.8	4.6	319.2	226.5
EE	1,278	1,112.1	23.4	5.3	5.1	4.1	3.9	870.2	678.7
ES	365,703	78,062.0	23.2	3.5	3.5	3.7	3.4	213.5	165.9
FI	13,978	6,608.0	19.9	3.4	3.4	7.5	8.2	472.7	383.0
FR	448,147	123,952.4	23.6	2.8	2.9	6.8	7.9	276.6	213.7
GR	7,512	6,958.8	22.4	5.1	4.8	7.4	7.2	926.4	727.6
IE	13,414	10,476.1	17.3	3.8	4.0	3.2	3.6	781.0	657.6
IT	329,247	148,139.7	24.8	3.8	3.7	2.3	2.6	449.9	342.0
LT	1,746	1,272.2	26.9	4.8	5.1	5.1	4.7	728.6	542.0
LU	7,444	12,672.8	20.4	2.9	2.9	2.4	2.9	1,702.4	1,371.3
LV	635	487.5	29.3	5.3	5.4	4.4	4.4	767.7	564.4
MT	496	399.4	29.7	4.1	4.3	7.1	6.6	805.2	585.3
NL	14,653	23,909.7	11.6	3.8	3.7	7.5	8.2	1,631.7	1,458.8
PT	50,550	9,342.2	11.9	3.7	3.7	4.5	4.3	184.8	164.6
SI	4,059	2,164.5	13.3	3.6	3.6	3.6	3.6	533.3	468.6
SK	5,621	2,883.3	20.3	3.7	3.9	4.0	4.4	513.0	414.0

Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The first column represents the country of residence of the bank.

Table A.4. Summary Statistics Before and After the Exclusion of Loans with Missing Data, 2022:Q1 and 2023:Q4

			Share of Loans with Missing Data, %		W. Mean Rate, %		W. Mean Maturity, Years		Value of the Loan, Thsd. of EUR	
Country	Number of Loans	Total Value, Bill. of EUR	Number	Value	All Loans	Excl. Missing	All Loans	Excl. Missing	All Loans	Excl. Missing
AT	27,871	26,005.5	45.3	37.8	3.2	3.2	8.0	7.9	933.1	1,061.6
BE	84,969	36,895.2	21.3	22.5	3.7	3.8	3.3	3.2	434.2	427.5
CY	1,816	751.6	36.9	42.0	4.4	4.4	6.9	6.8	413.9	380.6
DE	370,316	83,859.8	45.4	33.9	3.5	3.6	4.6	4.9	226.5	274.4
EE	1,255	851.8	14.7	19.9	5.1	5.0	3.9	4.1	678.7	637.5
ES	361,680	59,986.3	38.1	31.1	3.5	3.7	3.4	3.4	165.9	184.6
FI	13,821	5,293.7	19.7	18.4	3.4	3.3	8.2	8.1	383.0	389.5
FR	443,043	94,680.5	37.7	54.1	2.9	2.9	7.9	6.0	213.7	157.5
GR	7,426	5,402.9	49.6	36.4	4.8	4.7	7.2	7.0	727.6	917.5
IE	13,175	8,664.0	77.2	58.2	4.0	4.0	3.6	3.5	657.6	1,204.1
IT	325,625	111,354.2	19.8	9.4	3.7	3.7	2.6	2.5	342.0	386.4
LT	1,717	930.5	20.5	22.3	5.1	4.9	4.7	4.8	542.0	529.5
LU	7,357	10,088.4	56.9	43.2	2.9	2.5	2.9	3.1	1,371.3	1,806.4
LV	611	344.9	15.5	23.8	5.4	5.2	4.4	4.5	564.4	509.5
MT	480	280.9	58.5	57.8	4.3	4.6	6.6	6.7	585.3	595.5
NL	14,483	21,128.3	14.2	39.3	3.7	3.9	8.2	9.1	1,458.8	1,032.6
PT	49,993	8,230.7	16.9	13.1	3.7	3.7	4.3	4.3	164.6	172.2
SI	4,006	1,877.2	12.2	23.1	3.6	3.7	3.6	3.8	468.6	410.6
SK	5,550	2,297.5	4.7	17.9	3.9	4.0	4.4	4.8	414.0	356.9

Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The first column represents the country of residence of the bank.

Table A.5. Regression Results for Conditional Change in Total Rate, Relevant Risk-Free Rate and Premium between 2022:Q1 and 2022:Q2, 2022:Q3, . . ., 2023:Q4

		2022:Q2	**2022:Q3**	**2022:Q4**	**2023:Q1**	**2023:Q2**	**2023:Q3**	**2023:Q4**
Dummy for Post Period (D_{post})	Total Rate	0.57***	1.14***	1.99***	2.44***	2.82***	3.02***	3.11***
		(0.04)	(0.05)	(0.05)	(0.07)	(0.04)	(0.04)	(0.05)
	Ref. Rate	1.16***	1.52***	2.27***	2.38***	2.47***	2.65***	2.45***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Premium	–0.59***	–0.38***	–0.28***	0.06	0.34***	0.37***	0.66***
		(0.04)	(0.05)	(0.05)	(0.07)	(0.03)	(0.03)	(0.04)
$D_{post} \times (0, 1]$ Month Risk-Free Rate	Total Rate	–0.51***	–0.60***	–0.36**	0.17	0.49**	0.88***	1.01***
		(0.06)	(0.12)	(0.17)	(0.16)	(0.17)	(0.16)	(0.16)
	Ref. Rate	–1.42***	–1.07***	–0.51***	0.43***	1.13***	1.49***	1.99***
		(0.04)	(0.05)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)
	Premium	0.91***	0.47***	0.15	–0.26	–0.64***	–0.61***	–0.98***
		(0.07)	(0.12)	(0.17)	(0.16)	(0.17)	(0.16)	(0.15)
$D_{post} \times (1, 3]$ Month Risk-Free Rate	Total Rate	–0.53***	–0.63***	–0.34***	0.08	0.50***	0.79***	0.92***
		(0.05)	(0.07)	(0.10)	(0.11)	(0.09)	(0.12)	(0.13)
	Ref. Rate	–1.26***	–0.71***	–0.12***	0.72***	1.31***	1.58***	1.97***
		(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Premium	0.73***	0.08	–0.22**	–0.65***	–0.81***	–0.79***	–1.05***
		(0.06)	(0.07)	(0.10)	(0.10)	(0.09)	(0.12)	(0.12)
$D_{post} \times (3, 6]$ Month Risk-Free Rate	Total Rate	–0.51***	–0.41***	–0.15	0.29**	0.59***	0.83***	0.80***
		(0.04)	(0.06)	(0.08)	(0.10)	(0.10)	(0.12)	(0.12)
	Ref. Rate	–1.05***	–0.39***	0.18***	0.97***	1.42***	1.60***	1.89***
		(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
	Premium	0.54***	–0.01	–0.33***	–0.67***	–0.82***	–0.77***	–1.09***
		(0.05)	(0.07)	(0.08)	(0.09)	(0.09)	(0.12)	(0.11)

(*continued*)

Table A.5. (Continued)

		2022:Q2	2022:Q3	2022:Q4	2023:Q1	2023:Q2	2023:Q3	2023:Q4
$D_{post} \times$ (6, 12] Month Risk-Free Rate	Total Rate	–0.34***	–0.03	0.09	0.45***	0.69***	0.80***	0.73***
		(0.06)	(0.10)	(0.12)	(0.09)	(0.07)	(0.08)	(0.09)
	Ref. Rate	–0.82***	–0.09**	0.46***	1.08***	1.43***	1.55***	1.63***
		(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
	Premium	0.48***	0.06	–0.37***	–0.63***	–0.74***	–0.76***	–0.90***
		(0.05)	(0.08)	(0.11)	(0.07)	(0.06)	(0.07)	(0.09)
$D_{post} \times$ (1, 2] Year Risk-Free Rate	Total Rate	–0.40***	–0.15**	–0.03	0.24**	0.38***	0.51***	0.36***
		(0.04)	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)
	Ref. Rate	–0.62***	–0.02	0.54***	1.04***	1.25***	1.33***	1.20***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
	Premium	0.22***	–0.13	–0.57***	–0.80***	–0.86***	–0.82***	–0.85***
		(0.05)	(0.07)	(0.09)	(0.09)	(0.08)	(0.08)	(0.08)
$D_{post} \times$ (2, 5] Year Risk-Free Rate	Total Rate	–0.13**	–0.04	0.13*	0.16*	0.17*	0.19*	0.17**
		(0.04)	(0.05)	(0.05)	(0.08)	(0.08)	(0.10)	(0.06)
	Ref. Rate	–0.12***	–0.02	0.32***	0.51***	0.53***	0.52***	0.35***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
	Premium	–0.01	–0.01	–0.19***	–0.35***	–0.36***	–0.33***	–0.18**
		(0.04)	(0.05)	(0.05)	(0.07)	(0.09)	(0.09)	(0.06)

Source: AnaCredit.

Note: This table replicates results from Table 2 for all post-quarters from 2022:Q2 until 2023:Q4. Only results for post-quarter dummy variables are reported for brevity. *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. Ref. Rate stands for risk-free rate. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Results are obtained by WLS, where weights are determined by the loan values. D_{post} denotes a binary variable that equals one for a respective post-quarter and zero for 2022:Q1. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.6. Regression Results for Conditional Change in Total Rate, Relevant Risk-Free Rate, and Premium between 2022:Q1 and 2023:Q4, Excluding Revolving Credits

Variables	Total Rate (1)	Relevant Risk-Free Rate (2)	Premium (3)
Dummy for 2023:Q4 (D_{2023Q4})	3.11***	2.42***	0.69***
	(0.05)	(0.02)	(0.04)
D_{2023Q4} × $(0, 1]$ Month Risk-Free Rate	1.13***	2.04***	–0.90***
	(0.18)	(0.03)	(0.17)
D_{2023Q4} × $(1, 3]$ Month Risk-Free Rate	0.93***	2.01***	–1.08***
	(0.13)	(0.03)	(0.13)
D_{2023Q4} × $(3, 6]$ Month Risk-Free Rate	0.82***	1.92***	–1.10***
	(0.13)	(0.03)	(0.13)
D_{2023Q4} × $(6, 12]$ Month Risk-Free Rate	0.77***	1.65***	–0.88***
	(0.09)	(0.04)	(0.08)
D_{2023Q4} × $(1, 2]$ Year Risk-Free Rate	0.31***	1.19***	–0.88***
	(0.08)	(0.03)	(0.08)
D_{2023Q4} × $(2, 5]$ Year Risk-Free Rate	0.20***	0.34***	–0.14*
	(0.06)	(0.02)	(0.06)
D_{2023Q4} × Floating Rate	–0.04	0.07**	–0.11
	(0.15)	(0.02)	(0.16)
D_{2023Q4} × Adjustment More Frequent Than Reference Rate Maturity	0.18	–0.01	0.19
	(0.20)	(0.02)	(0.20)
D_{2023Q4} × Adjustment Less Frequent Than Reference Rate Maturity	–0.11	–0.04	–0.08
	(0.25)	(0.03)	(0.23)
D_{2023Q4} × Non-EUR Reference Rate	0.18	–0.04	0.23*
	(0.11)	(0.02)	(0.11)
D_{2023Q4} × Other Single Reference Rate	–0.37	–0.05	–0.32
	(0.29)	(0.04)	(0.28)
D_{2023Q4} × Multiple Reference Rates	–0.41	–0.08	–0.33
	(0.28)	(0.05)	(0.30)
D_{2023Q4} × Cross-Border Loans	–0.21	0.01	–0.22
	(0.16)	(0.02)	(0.16)
Probability of Default (Imputed if Missing)	9.23***	0.00	9.23***
	(1.15)	(0.07)	(1.13)

(*continued*)

Table A.6. (Continued)

Variables	Total Rate (1)	Relevant Risk-Free Rate (2)	Premium (3)
Fixed Effects:			
Creditor Country	Yes	Yes	Yes
Bank	Yes	Yes	Yes
Loan Type × Creditor Country	Yes	Yes	Yes
Debtor Sector × Debtor Country	Yes	Yes	Yes
Debtor Region	Yes	Yes	Yes
Firm Size Class × Creditor Country	Yes	Yes	Yes
Loan Maturity × Creditor Country	Yes	Yes	Yes
Collateral Size × Creditor Country	Yes	Yes	Yes
Cross-Border Loan × Creditor Country	Yes	Yes	Yes
Multidebtor Loan × Creditor Country	Yes	Yes	Yes
Reference Rate Type × Creditor Country	Yes	Yes	Yes
Risk-Free Rate Maturity × Creditor Country	Yes	Yes	Yes
Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes
Number of Observations	1,031,655	1,031,655	1,031,655
R^2	0.85	0.99	0.48
Within R^2	0.78	0.98	0.09
Standard Errors Clustered by	Bank	Bank	Bank

Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Results are obtained by WLS, where weights are determined by the loan values. D_{2023Q4} denotes a binary variable that equals one for 2023:Q4 and zero for 2022:Q1. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.7. Regression Results for Conditional Change in Total Rate, Relevant Risk-Free Rate, and Premium between 2022:Q1 and 2023:Q4, Three-Year Adjustment for Fixed-Rate Loan

	Total Rate	Relevant Risk-Free Rate	Premium
Variables	**(1)**	**(2)**	**(3)**
Dummy for 2023:Q4 (D_{2023Q4})	3.18***	2.88***	0.29*
	(0.12)	(0.02)	(0.13)
$D_{2023Q4} \times (0, 1]$ Month Risk-Free Rate	0.97***	1.63***	–0.66***
	(0.13)	(0.02)	(0.12)
$D_{2023Q4} \times (1, 3]$ Month Risk-Free Rate	0.87***	1.59***	–0.72***
	(0.16)	(0.02)	(0.16)
$D_{2023Q4} \times (3, 6]$ Month Risk-Free Rate	0.74***	1.50***	–0.76***
	(0.11)	(0.02)	(0.11)
$D_{2023Q4} \times (6, 12]$ Month Risk-Free Rate	0.68***	1.25***	–0.57***
	(0.08)	(0.03)	(0.09)
$D_{2023Q4} \times (1, 2]$ Year Risk-Free Rate	0.28*	0.86***	–0.58***
	(0.14)	(0.02)	(0.14)
$D_{2023Q4} \times (2, 5]$ Year Risk-Free Rate	—	—	—
$D_{2023Q4} \times$ Floating Rate	–0.03	–0.01	–0.02
	(0.12)	(0.01)	(0.12)
$D_{2023Q4} \times$ Adjustment More Frequent Than Reference Rate Maturity	0.11	0.02	0.09
	(0.19)	(0.01)	(0.19)
$D_{2023Q4} \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.07	0.00	–0.07
	(0.24)	(0.03)	(0.23)
$D_{2023Q4} \times$ Non-EUR Reference Rate	0.18	–0.04	0.23*
	(0.11)	(0.02)	(0.11)
$D_{2023Q4} \times$ Other Single Reference Rate	–0.12	–0.03	–0.09
	(0.16)	(0.04)	(0.16)
$D_{2023Q4} \times$ Multiple Reference Rates	–0.26	–0.11*	–0.16
	(0.28)	(0.05)	(0.31)
$D_{2023Q4} \times$ Cross-Border Loans	–0.17	0.00	–0.17
	(0.14)	(0.02)	(0.15)
Probability of Default (Imputed if Missing)	9.50***	–0.04	9.54***
	(1.12)	(0.06)	(1.12)

(*continued*)

Table A.7. (Continued)

Variables	Total Rate (1)	Relevant Risk-Free Rate (2)	Premium (3)
Fixed Effects:			
Creditor Country	Yes	Yes	Yes
Bank	Yes	Yes	Yes
Loan Type × Creditor Country	Yes	Yes	Yes
Debtor Sector × Debtor Country	Yes	Yes	Yes
Debtor Region	Yes	Yes	Yes
Firm Size Class × Creditor Country	Yes	Yes	Yes
Loan Maturity × Creditor Country	Yes	Yes	Yes
Collateral Size × Creditor Country	Yes	Yes	Yes
Cross-Border Loan × Creditor Country	Yes	Yes	Yes
Multidebtor Loan × Creditor Country	Yes	Yes	Yes
Reference Rate Type × Creditor Country	Yes	Yes	Yes
Risk-Free Rate Maturity × Creditor Country	Yes	Yes	Yes
Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes
Number of Observations	1,133,053	1,133,053	1,133,053
R^2	0.85	0.99	0.45
Within R^2	0.78	0.99	0.07
Standard Errors Clustered by	Bank	Bank	Bank

Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Results are obtained by WLS, where weights are determined by the loan values. D_{2023Q4} denotes a binary variable that equals one for 2023:Q4 and zero for 2022:Q1. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.8. Regression Results for Conditional Change in Total Rate, Relevant Risk-Free Rate, and Premium between 2022:Q1 and 2023:Q4, Using Non-imputed PD Observations Only

Variables	Total Rate (1)	Relevant Risk-Free Rate (2)	Premium (3)
Dummy for 2023:Q4 (D_{2023Q4})	3.11***	2.44***	0.67***
	(0.06)	(0.03)	(0.05)
$D_{2023Q4} \times (0, 1]$ Month Risk-Free Rate	1.07***	2.01***	–0.94***
	(0.18)	(0.03)	(0.18)
$D_{2023Q4} \times (1, 3]$ Month Risk-Free Rate	0.93***	1.98***	–1.05***
	(0.15)	(0.03)	(0.14)
$D_{2023Q4} \times (3, 6]$ Month Risk-Free Rate	0.80***	1.91***	–1.10***
	(0.14)	(0.04)	(0.13)
$D_{2023Q4} \times (6, 12]$ Month Risk-Free Rate	0.71***	1.67***	–0.96***
	(0.11)	(0.05)	(0.10)
$D_{2023Q4} \times (1, 2]$ Year Risk-Free Rate	0.46***	1.24***	–0.77***
	(0.09)	(0.03)	(0.09)
$D_{2023Q4} \times (2, 5]$ Year Risk-Free Rate	0.21**	0.37***	–0.16
	(0.08)	(0.03)	(0.08)
$D_{2023Q4} \times$ Floating Rate	0.02	0.07*	–0.05
	(0.19)	(0.03)	(0.19)
$D_{2023Q4} \times$ Adjustment More Frequent Than Reference Rate Maturity	0.29	0.01	0.28
	(0.23)	(0.02)	(0.23)
$D_{2023Q4} \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.13	–0.04	–0.10
	(0.17)	(0.03)	(0.16)
$D_{2023Q4} \times$ Non-EUR Reference Rate	0.10	–0.04	0.14
	(0.13)	(0.02)	(0.13)
$D_{2023Q4} \times$ Other Single Reference Rate	–0.07	–0.05	–0.02
	(0.16)	(0.07)	(0.15)
$D_{2023Q4} \times$ Multiple Reference Rates	–0.89**	–0.11	–0.77**
	(0.27)	(0.08)	(0.27)
$D_{2023Q4} \times$ Cross-Border Loans	–0.38*	–0.01	–0.37
	(0.19)	(0.03)	(0.20)
Probability of Default (Imputed if Missing)	1.34***	–0.02*	1.37***
	(0.11)	(0.01)	(0.11)

(*continued*)

Table A.8. (Continued)

Variables	**Total Rate**	**Relevant Risk-Free Rate**	**Premium**
	(1)	**(2)**	**(3)**
Fixed Effects:			
Creditor Country	Yes	Yes	Yes
Bank	Yes	Yes	Yes
Loan Type × Creditor Country	Yes	Yes	Yes
Debtor Sector × Debtor Country	Yes	Yes	Yes
Debtor Region	Yes	Yes	Yes
Firm Size Class × Creditor Country	Yes	Yes	Yes
Loan Maturity × Creditor Country	Yes	Yes	Yes
Collateral Size × Creditor Country	Yes	Yes	Yes
Cross-Border Loan × Creditor Country	Yes	Yes	Yes
Multidebtor Loan × Creditor Country	Yes	Yes	Yes
Reference Rate Type × Creditor Country	Yes	Yes	Yes
Risk-Free Rate Maturity × Creditor Country	Yes	Yes	Yes
Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes
Number of Observations	841,004	841,004	841,004
R^2	0.85	0.99	0.44
Within R^2	0.78	0.98	0.07
Standard Errors Clustered by	Bank	Bank	Bank

Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Results are obtained by WLS, where weights are determined by the loan values. D_{2023Q4} denotes a binary variable that equals one for 2023:Q4 and zero for 2022:Q1. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.9. Regression Results for the Pass-Through of Monetary Policy Rates to Lending Rates, Relevant Risk-Free Rate, and Premium, Excluding Revolving Credits

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Change in DF Rate (ΔDF Instrumented by Target and Timing Surprises)	0.19*	0.65***	0.42***	–0.21***	–0.17***	–0.64***	0.40***	0.82***	1.05***
	(0.08)	(0.14)	(0.10)	(0.02)	(0.02)	(0.03)	(0.08)	(0.13)	(0.10)
$\Delta DF \times (0, 1]$ Month Risk-Free Rate	0.20	0.68*	1.47***	1.08***	1.54***	2.23***	–0.89***	–0.87**	–0.77**
	(0.13)	(0.27)	(0.23)	(0.06)	(0.06)	(0.08)	(0.13)	(0.29)	(0.27)
$\Delta DF \times (1, 3]$ Month Risk-Free Rate	0.14	0.57	1.17***	0.78***	1.21***	1.89***	–0.63***	–0.64	–0.72**
	(0.14)	(0.36)	(0.25)	(0.05)	(0.05)	(0.05)	(0.12)	(0.38)	(0.27)
$\Delta DF \times (3, 6]$ Month Risk-Free Rate	0.09	0.29	0.98***	0.66***	1.08***	1.65***	–0.57***	–0.79***	–0.67***
	(0.12)	(0.17)	(0.14)	(0.04)	(0.04)	(0.05)	(0.12)	(0.18)	(0.16)
$\Delta DF \times (6, 12]$ Month Risk-Free Rate	0.30***	0.34	0.72***	0.58***	0.88***	1.35***	–0.28***	–0.54**	–0.63**
	(0.08)	(0.18)	(0.20)	(0.05)	(0.06)	(0.06)	(0.08)	(0.20)	(0.21)
$\Delta DF \times (1, 2]$ Year Risk-Free Rate	0.17	0.04	0.79***	0.61***	0.85***	1.32***	–0.44**	–0.81***	–0.53**
	(0.13)	(0.16)	(0.19)	(0.04)	(0.04)	(0.08)	(0.14)	(0.17)	(0.17)
$\Delta DF \times (2, 5]$ Year Risk-Free Rate	–0.18	–0.22	0.36***	0.16***	0.05	0.50***	–0.33*	–0.28	–0.14
	(0.13)	(0.21)	(0.11)	(0.03)	(0.03)	(0.04)	(0.13)	(0.21)	(0.11)
$\Delta DF \times$ Floating Rate	0.09	–0.26	–0.43*	–0.13**	–0.12*	–0.08	0.22*	–0.14	–0.35
	(0.11)	(0.25)	(0.21)	(0.05)	(0.05)	(0.09)	(0.10)	(0.28)	(0.26)
$\Delta DF \times$ Adjustment More Frequent Than Reference Rate Maturity	0.00	0.15	0.22	0.03	0.07**	–0.01	–0.03	0.07	0.22
	(0.10)	(0.15)	(0.16)	(0.03)	(0.02)	(0.07)	(0.10)	(0.16)	(0.21)
$\Delta DF \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.14	–0.12	0.11	0.05	0.04	0.09	–0.19	–0.15	0.03
	(0.26)	(0.29)	(0.35)	(0.06)	(0.08)	(0.11)	(0.24)	(0.30)	(0.32)
$\Delta DF \times$ Non-EUR Reference Rate	–0.13*	0.00	–0.13	0.12	0.09	0.14*	–0.24**	–0.09	–0.27**
	(0.06)	(0.08)	(0.10)	(0.06)	(0.06)	(0.06)	(0.08)	(0.08)	(0.09)
$\Delta DF \times$ Other Single Reference Rate	–0.15	–0.35*	–0.61**	–0.02	–0.05	–0.02	–0.13	–0.30	–0.59**
	(0.11)	(0.18)	(0.23)	(0.06)	(0.08)	(0.08)	(0.11)	(0.20)	(0.22)
$\Delta DF \times$ Multiple Reference Rates	–0.56	–0.71*	–0.42	0.23**	0.50*	0.36**	–0.79	–1.21***	–0.78
	(0.47)	(0.34)	(0.36)	(0.08)	(0.19)	(0.14)	(0.46)	(0.30)	(0.44)
$\Delta DF \times$ Cross-Border Loans	0.41**	0.22	–0.04	0.07*	0.08*	0.16*	0.34*	0.14	–0.19
	(0.15)	(0.24)	(0.29)	(0.03)	(0.04)	(0.07)	(0.16)	(0.25)	(0.34)
Probability of Default (Imputed if Missing)	7.86***	7.78***	7.59***	–0.03	–0.11	–0.17	7.90***	7.89***	7.76***
	(0.84)	(0.80)	(0.80)	(0.05)	(0.07)	(0.10)	(0.84)	(0.80)	(0.81)

(*continued*)

Table A.9. (Continued)

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Fixed Effects:									
GovC Period (τ) × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Sector × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Firm Size Class × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Collateral Size × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Cross-Border Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Multidebtor Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	5,724,844	5,660,635	5,434,006	5,724,844	5,660,635	5,434,006	5,724,844	5,660,635	5,434,006
R^2	0.81	0.80	0.79	0.98	0.97	0.95	0.63	0.62	0.61
Within R^2	0.03	0.07	0.10	0.15	0.35	0.34	0.02	0.02	0.03
Standard Errors Clustered by	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022 and 2023, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Horizon $h = 1$ corresponds to the period of 6 weeks, $h = 2$ to 7–12 weeks, and $h = 3$ to 13–18 weeks following the Governing Council meeting. Results are obtained by weighted TSLS, where weights are determined by the loan values. Changes in the deposit facility rate are instrumented by target and timing surprises. ΔDF denotes changes in the DF rate. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.10. Regression Results for the Pass-Through of Monetary Policy Rates to Lending Rates, Relevant Risk-Free Rate, and Premium, Controlling for the Preexisting Trends

	Total Rate			**Relevant Risk-Free Rate**			**Premium**		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Change in DF Rate (ΔDF Instrumented by Target and Timing Surprises)	0.22**	0.70***	0.81***	–0.19***	–0.03	–0.08	0.41***	0.73***	0.89***
	(0.08)	(0.14)	(0.11)	(0.02)	(0.02)	(0.05)	(0.09)	(0.13)	(0.11)
$\Delta DF \times (0,1]$ Month Risk-Free Rate	0.34*	0.78**	1.46***	1.10***	1.53***	2.23***	–0.77***	–0.75**	–0.77**
	(0.13)	(0.25)	(0.21)	(0.05)	(0.07)	(0.21)	(0.14)	(0.27)	(0.28)
$\Delta DF \times (1,3]$ Month Risk-Free Rate	0.19	0.64*	1.15***	0.77***	1.21***	1.79***	–0.58***	–0.57	–0.63*
	(0.13)	(0.32)	(0.21)	(0.05)	(0.06)	(0.16)	(0.12)	(0.35)	(0.30)
$\Delta DF \times (3,6]$ Month Risk-Free Rate	0.03	0.37**	0.90***	0.62***	1.01***	1.54***	–0.59***	–0.64***	–0.64***
	(0.11)	(0.14)	(0.13)	(0.04)	(0.03)	(0.09)	(0.12)	(0.15)	(0.16)
$\Delta DF \times (6,12]$ Month Risk-Free Rate	0.22*	0.36	0.57**	0.56***	0.90***	1.31***	–0.34***	–0.55**	–0.75***
	(0.10)	(0.20)	(0.21)	(0.05)	(0.04)	(0.10)	(0.09)	(0.20)	(0.22)
$\Delta DF \times (1,2]$ Year Risk-Free Rate	0.41*	0.12	0.53*	0.66***	0.87***	1.19***	–0.26	–0.75***	–0.66***
	(0.16)	(0.17)	(0.22)	(0.03)	(0.05)	(0.11)	(0.16)	(0.15)	(0.17)
$\Delta DF \times (2,5]$ Year Risk-Free Rate	–0.09	–0.15	0.22	0.19***	0.08**	0.46***	–0.28*	–0.23	–0.24*
	(0.11)	(0.18)	(0.12)	(0.02)	(0.03)	(0.04)	(0.12)	(0.19)	(0.12)
$\Delta DF \times$ Adjustable Rate	0.05	–0.32	–0.32	–0.08	–0.02	0.04	0.13	–0.30	–0.35
	(0.11)	(0.25)	(0.21)	(0.05)	(0.06)	(0.15)	(0.10)	(0.27)	(0.29)
$\Delta DF \times$ Adjustment More Frequent Than Reference Rate Maturity	–0.03	0.10	0.01	–0.06	–0.02	–0.11	0.03	0.11	0.12
	(0.10)	(0.13)	(0.25)	(0.04)	(0.05)	(0.16)	(0.08)	(0.13)	(0.20)
$\Delta DF \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.04	–0.08	0.30	0.06	0.04	0.20	–0.10	–0.12	0.10
	(0.21)	(0.26)	(0.35)	(0.07)	(0.08)	(0.22)	(0.21)	(0.29)	(0.27)
$\Delta DF \times$ Non-EUR Reference Rate	–0.11	0.13	–0.07	0.16*	0.18	0.23	–0.28**	–0.05	–0.30*
	(0.07)	(0.11)	(0.30)	(0.07)	(0.10)	(0.35)	(0.10)	(0.09)	(0.13)
$\Delta DF \times$ Other Single Reference Rate	–0.10	–0.15	–0.47*	–0.06	–0.05	–0.17	–0.04	–0.10	–0.30
	(0.10)	(0.16)	(0.23)	(0.06)	(0.10)	(0.25)	(0.11)	(0.20)	(0.24)
$\Delta DF \times$ Multiple Reference Rates	–0.55	–0.82*	–0.63	0.04	0.04	–0.24	–0.59	–0.86*	–0.39
	(0.41)	(0.36)	(0.61)	(0.09)	(0.08)	(0.41)	(0.47)	(0.36)	(0.35)
$\Delta DF \times$ Cross-Border Loans	0.23	0.14	–0.18	0.05	0.03	0.02	0.18	0.11	–0.21
	(0.16)	(0.19)	(0.26)	(0.03)	(0.03)	(0.10)	(0.16)	(0.20)	(0.25)
Changes in 6M OIS Rate Before GovC Meeting	0.28***	0.56***	0.92***	0.56***	1.07***	1.43***	–0.28***	–0.51***	–0.50**
	(0.05)	(0.15)	(0.16)	(0.03)	(0.02)	(0.02)	(0.06)	(0.15)	(0.16)
Probability of Default (Imputed if Missing)	8.22***	8.12***	7.96***	0.01	–0.08	–0.15	8.21***	8.20***	8.11***
	(0.79)	(0.74)	(0.74)	(0.05)	(0.06)	(0.09)	(0.80)	(0.76)	(0.76)

(*continued*)

Table A.10. (Continued)

Variables	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fixed Effects:									
GovC Period (τ) × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Sector × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Firm Size Class × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Collateral Size × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Cross-Border Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Multidebtor Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	6,240,534	6,172,211	5,922,246	6,240,534	6,172,211	5,922,246	6,240,534	6,172,211	5,922,246
R^2	0.81	0.80	0.79	0.99	0.98	0.96	0.61	0.60	0.60
Within R^2	0.04	0.07	0.12	0.23	0.50	0.55	0.03	0.03	0.03
Standard Errors Clustered by	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022 and 2023, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Horizon $h = 1$ corresponds to the period of 6 weeks, $h = 2$ to 7–12 weeks, and $h = 3$ to 13–18 weeks following the Governing Council meeting. Results are obtained by weighted TSLS, where weights are determined by the loan values. Changes in the deposit facility rate are instrumented by target and timing surprises. ΔDF denotes changes in DF rate. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.11. Regression Results for the Pass-Through of Monetary Policy Rates to Lending Rates, Relevant Risk-Free Rate, and Premium, Three-Year Adjustment for Fixed-Rate Loans

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Change in DF Rate (ΔDF Instrumented by Target and Timing Surprises)	0.15	0.82**	0.76***	–0.03	–0.08	–0.16*	0.18	0.90**	0.92***
	(0.13)	(0.31)	(0.23)	(0.05)	(0.05)	(0.07)	(0.13)	(0.32)	(0.26)
$\Delta DF \times (0, 1]$ Month Risk-Free Rate	0.37***	0.48**	1.04***	0.89***	1.42***	1.76***	–0.52***	–0.95***	–0.73***
	(0.11)	(0.18)	(0.13)	(0.03)	(0.04)	(0.05)	(0.12)	(0.18)	(0.15)
$\Delta DF \times (1, 3]$ Month Risk-Free Rate	0.23*	0.37	0.82***	0.57***	1.10***	1.41***	–0.35**	–0.73**	–0.59**
	(0.10)	(0.23)	(0.17)	(0.03)	(0.03)	(0.05)	(0.11)	(0.23)	(0.20)
$\Delta DF \times (3, 6]$ Month Risk-Free Rate	0.08	0.15	0.57***	0.44***	0.94***	1.15***	–0.37**	–0.80***	–0.58**
	(0.13)	(0.22)	(0.17)	(0.04)	(0.04)	(0.06)	(0.13)	(0.22)	(0.19)
$\Delta DF \times (6, 12]$ Month Risk-Free Rate	0.25*	0.08	0.18	0.35***	0.76***	0.84***	–0.10	–0.67**	–0.66***
	(0.13)	(0.22)	(0.17)	(0.07)	(0.08)	(0.07)	(0.11)	(0.22)	(0.19)
$\Delta DF \times (1, 2]$ Year Risk-Free Rate	0.42*	–0.10	0.24	0.38***	0.71***	0.77***	0.04	–0.80**	–0.54*
	(0.19)	(0.28)	(0.24)	(0.05)	(0.05)	(0.11)	(0.20)	(0.30)	(0.25)
$\Delta DF \times (2, 5]$ Year Risk-Free Rate	—	—	—	—	—	—	—	—	—
$\Delta DF \times$ Floating Rate	0.00	–0.29	–0.35	–0.11*	–0.10*	–0.09	0.11	–0.19	–0.27
	(0.10)	(0.23)	(0.20)	(0.04)	(0.04)	(0.08)	(0.09)	(0.25)	(0.24)
$\Delta DF \times$ Adjustment More Frequent Than Reference Rate Maturity	0.03	0.10	–0.01	0.04	0.08*	–0.08	–0.01	0.02	0.08
	(0.09)	(0.14)	(0.18)	(0.03)	(0.03)	(0.08)	(0.08)	(0.14)	(0.22)
$\Delta DF \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.07	–0.08	0.23	0.02	0.04	0.10	–0.09	–0.12	0.13
	(0.21)	(0.26)	(0.28)	(0.05)	(0.07)	(0.11)	(0.20)	(0.28)	(0.27)
$\Delta DF \times$ Non-EUR Reference Rate	–0.15*	0.08	–0.11	0.11	0.09	0.16**	–0.26**	–0.01	–0.27*
	(0.06)	(0.09)	(0.10)	(0.06)	(0.06)	(0.06)	(0.09)	(0.08)	(0.11)
$\Delta DF \times$ Other Single Reference Rate	–0.08	–0.16	–0.37	–0.02	–0.04	–0.01	–0.06	–0.12	–0.36
	(0.10)	(0.16)	(0.20)	(0.06)	(0.07)	(0.09)	(0.11)	(0.19)	(0.21)
$\Delta DF \times$ Multiple Reference Rates	–0.42	–0.61	–0.20	0.12	0.47*	0.37**	–0.53	–1.09**	–0.57
	(0.46)	(0.37)	(0.33)	(0.07)	(0.19)	(0.13)	(0.46)	(0.35)	(0.42)
$\Delta DF \times$ Cross-Border Loans	0.23	0.15	–0.11	0.06	0.08*	0.12	0.17	0.07	–0.24
	(0.16)	(0.20)	(0.23)	(0.03)	(0.04)	(0.07)	(0.17)	(0.20)	(0.26)
Probability of Default (Imputed if Missing)	8.22***	8.12***	7.94***	0.02	–0.07	–0.14	8.19***	8.19***	8.08***
	(0.80)	(0.74)	(0.74)	(0.04)	(0.06)	(0.09)	(0.80)	(0.75)	(0.76)

(*continued*)

Table A.11. (Continued)

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Fixed Effects:									
GovC Period (τ) × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Sector × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Firm Size Class × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Collateral Size × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Cross-Border Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Multidebtor Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	6,240,534	6,172,211	5,922,246	6,240,534	6,172,211	5,922,246	6,240,534	6,172,211	5,922,246
R^2	0.81	0.80	0.78	0.99	0.97	0.95	0.61	0.60	0.59
Within R^2	0.03	0.07	0.10	0.17	0.35	0.34	0.02	0.02	0.02
Standard Errors Clustered by	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022 and 2023, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Horizon $h = 1$ corresponds to the period of 6 weeks, $h = 2$ to 7–12 weeks, and $h = 3$ to 13–18 weeks following the Governing Council meeting. Results are obtained by weighted TSLS, where weights are determined by the loan values. Changes in the deposit facility rate are instrumented by target and timing surprises. ΔDF denotes changes in DF rate. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Table A.12. Regression Results for the Pass-Through of Monetary Policy Rates to Lending Rates, Relevant Risk-Free Rate, and Premium, Using Non-imputed PD Observations Only

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Change in DF Rate (ΔDF Instrumented by Target and Timing Surprises)	0.22*	0.71***	0.45***	–0.20***	–0.16***	–0.66***	0.41***	0.87***	1.11***
	(0.09)	(0.16)	(0.12)	(0.02)	(0.02)	(0.03)	(0.10)	(0.16)	(0.12)
$\Delta DF \times (0, 1]$ Month Risk-Free Rate	0.24	0.36	1.22***	1.09***	1.58***	2.31***	–0.86***	–1.22***	–1.10***
	(0.15)	(0.21)	(0.19)	(0.05)	(0.06)	(0.09)	(0.16)	(0.22)	(0.23)
$\Delta DF \times (1, 3]$ Month Risk-Free Rate	0.25*	0.18	0.94***	0.77***	1.24***	1.99***	–0.52***	–1.06***	–1.05***
	(0.12)	(0.21)	(0.14)	(0.04)	(0.05)	(0.05)	(0.13)	(0.20)	(0.15)
$\Delta DF \times (3, 6]$ Month Risk-Free Rate	0.01	0.20	0.89***	0.65***	1.07***	1.68***	–0.64***	–0.87***	–0.79***
	(0.12)	(0.16)	(0.15)	(0.04)	(0.04)	(0.06)	(0.12)	(0.16)	(0.16)
$\Delta DF \times (6, 12]$ Month Risk-Free Rate	0.16	0.04	0.42*	0.53***	0.89***	1.41***	–0.37***	–0.85***	–0.99***
	(0.11)	(0.17)	(0.18)	(0.05)	(0.05)	(0.06)	(0.10)	(0.17)	(0.20)
$\Delta DF \times (1, 2]$ Year Risk-Free Rate	0.22	0.17	0.70**	0.58***	0.86***	1.34***	–0.37	–0.69***	–0.64***
	(0.20)	(0.17)	(0.21)	(0.05)	(0.05)	(0.09)	(0.21)	(0.18)	(0.19)
$\Delta DF \times (2, 5]$ Year Risk-Free Rate	–0.04	–0.38	0.19	0.14***	0.03	0.55***	–0.19	–0.41	–0.36*
	(0.14)	(0.30)	(0.15)	(0.04)	(0.04)	(0.06)	(0.15)	(0.30)	(0.17)
$\Delta DF \times$ Floating Rate	–0.04	–0.13	–0.26	–0.15**	–0.19**	–0.15	0.11	0.05	–0.11
	(0.10)	(0.15)	(0.15)	(0.05)	(0.06)	(0.10)	(0.10)	(0.17)	(0.22)
$\Delta DF \times$ Adjustment More Frequent Than Reference Rate Maturity	–0.02	0.20	0.18	000	0.06	–0.08	–0.02	0.14	0.26
	(0.16)	(0.17)	(0.15)	(0.05)	(0.04)	(0.08)	(0.15)	(0.18)	(0.19)
$\Delta DF \times$ Adjustment Less Frequent Than Reference Rate Maturity	–0.40	–0.27	–0.08	0.01	–0.06	0.07	–0.41	–0.21	–0.15
	(0.37)	(0.42)	(0.43)	(0.07)	(0.07)	(0.19)	(0.35)	(0.43)	(0.37)
$\Delta DF \times$ Non-EUR Reference Rate	–0.11	0.15	–0.11	0.12*	0.12*	0.17**	–0.23**	0.03	–0.28*
	(0.09)	(0.11)	(0.13)	(0.06)	(0.06)	(0.06)	(0.08)	(0.09)	(0.12)
$\Delta DF \times$ Other Single Reference Rate	0.11	–0.18	–0.32	–0.01	0.04	–0.03	0.12	–0.22	–0.30
	(0.12)	(0.13)	(0.23)	(0.07)	(0.08)	(0.09)	(0.12)	(0.18)	(0.25)
$\Delta DF \times$ Multiple Reference Rates	–0.36	–0.68*	–0.18	0.25***	0.72***	0.57***	–0.62	–1.39***	–0.75
	(0.49)	(0.34)	(0.38)	(0.06)	(0.19)	(0.14)	(0.50)	(0.23)	(0.46)
$\Delta DF \times$ Cross-Border Loans	0.44	0.44*	0.29	0.02	0.04	0.12*	0.42	0.40*	0.17
	(0.23)	(0.19)	(0.17)	(0.04)	(0.05)	(0.06)	(0.24)	(0.18)	(0.15)
Probability of Default	1.12***	1.08***	1.08***	0.02	0.03	0.02	1.10***	1.05***	1.06***
	(0.11)	(0.11)	(0.11)	(0.02)	(0.02)	(0.01)	(0.11)	(0.11)	(0.11)

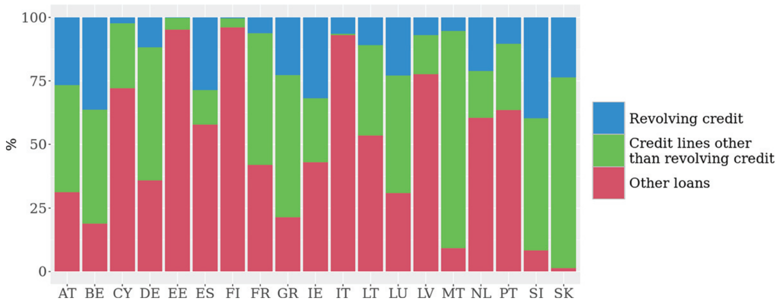
(*continued*)

Table A.12. (Continued)

	Total Rate			Relevant Risk-Free Rate			Premium		
	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$	$h = 1$	$h = 2$	$h = 3$
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Fixed Effects:									
GovC Period (τ) × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Sector × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Debtor Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Firm Size Class × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Loan Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Collateral Size × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Cross-Border Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Multidebtor Loan × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Type × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Maturity × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GovC Period (τ) × Reference Rate Adjustment Frequency × Creditor Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4,714,260	4,644,687	4,454,510	4,714,260	4,644,687	4,454,510	4,714,260	4,644,687	4,454,510
R^2	0.80	0.79	0.78	0.98	0.97	0.94	0.59	0.58	0.58
Within R^2	0.02	0.05	0.09	0.14	0.33	0.32	0.01	0.01	0.01
Standard Errors Clustered by	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank	Bank

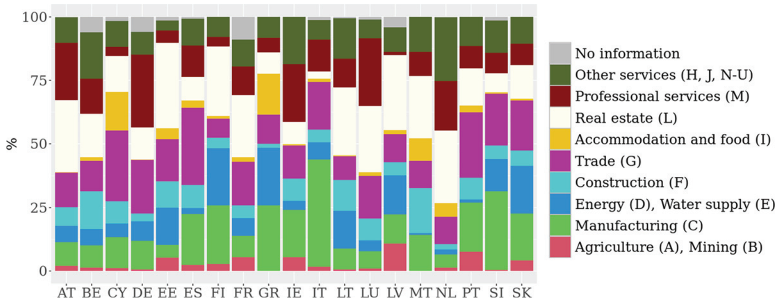
Source: AnaCredit.
Note: *** denotes significance at the 99.9 percent level, ** at 99 percent, and * at 95 percent. Standard errors are reported in parentheses. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022 and 2023, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Horizon $h = 1$ corresponds to the period of 6 weeks, $h = 2$ to 7–12 weeks, and $h = 3$ to 13–18 weeks following the Governing Council meeting. Results are obtained by weighted TSLS, where weights are determined by the loan values. Changes in the deposit facility rate are instrumented by target and timing surprises. ΔDF denotes changes in DF rate. Other variables (except the probability of default) are the binary (dummy) variables that equal one if a loan contract has a corresponding feature.

Figure A.1. Structure of Newly Issued Loans to NFCs in Euro-Area Countries by Loan Type, 2022–23



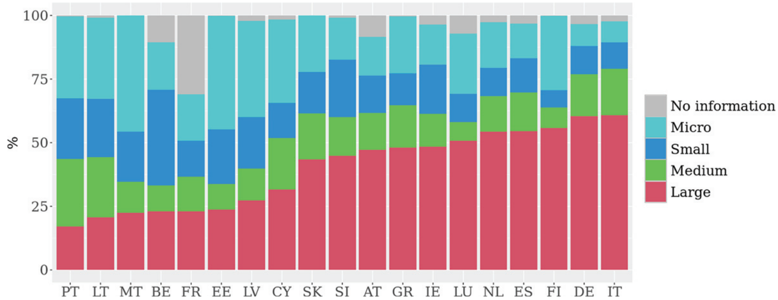
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.2. Structure of Newly Issued Loans to NFCs in Euro-Area Countries by Borrower's Macroeconomic Sector, 2022–23



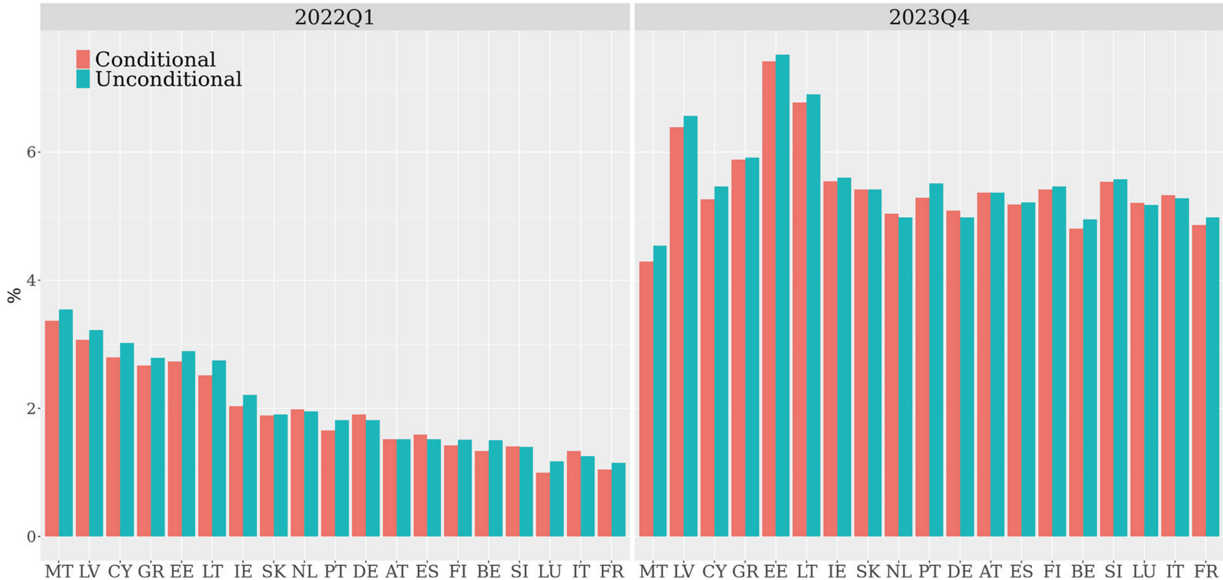
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.3. Structure of Newly Issued Loans to NFCs in Euro-Area Countries by Borrower's Size Class, 2022–23



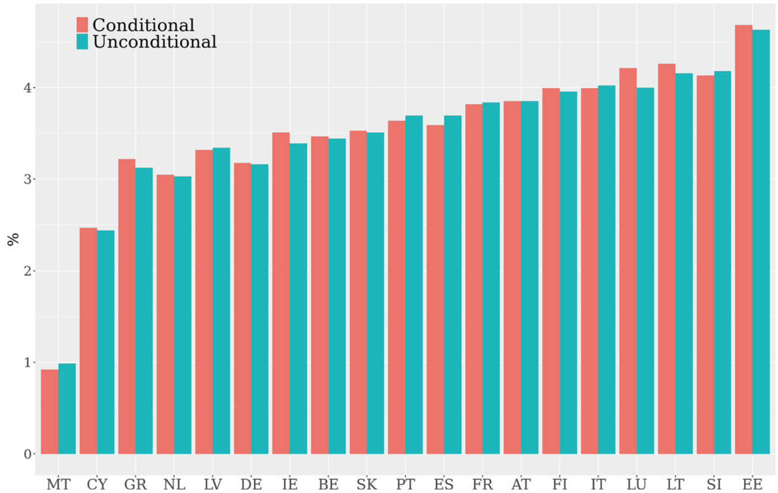
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Shares are value-weighted. Countries are arranged according to the share of loans to large enterprises. The horizontal axis represents the country of residence of the bank. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.4. Unconditional and Conditional Interest Rates of Newly Issued Loans to NFCs, 2022:Q1 and 2023:Q4



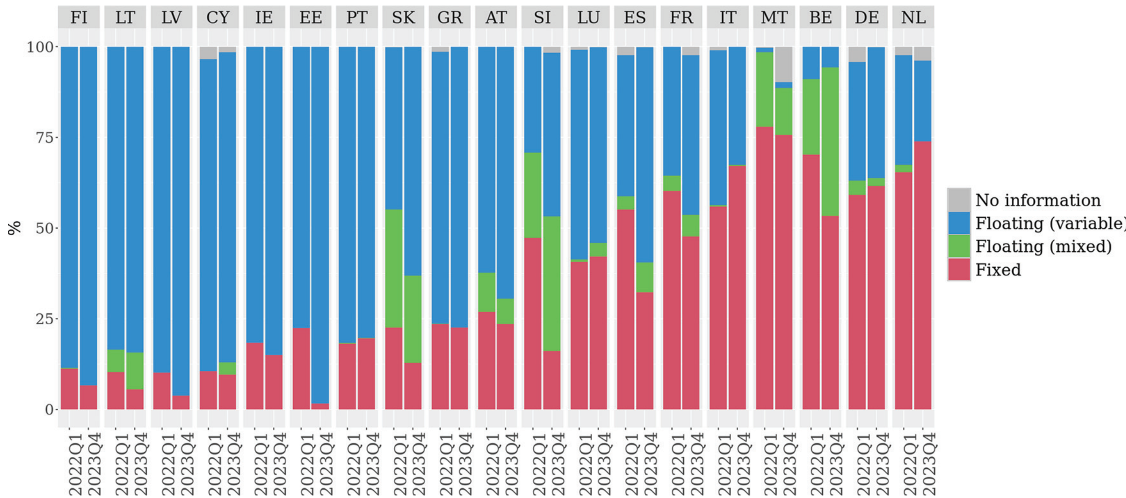
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with positive a interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The unconditional bar represents the unconditional weighted average, while the conditional bar depicts the weighted average controlling for the firm size category, macroeconomic sector, maturity category, loan type, and cross-border loan dummies (see footnote 15). The horizontal axis represents the country of residence of the bank. Countries are arranged according to the unconditional weighted average level of interest rates in 2022:Q1.

Figure A.5. Changes in Unconditional and Conditional Mean Interest Rates of Newly Issued Loans to NFCs in Euro-Area Countries between 2022:Q1 and 2023:Q4



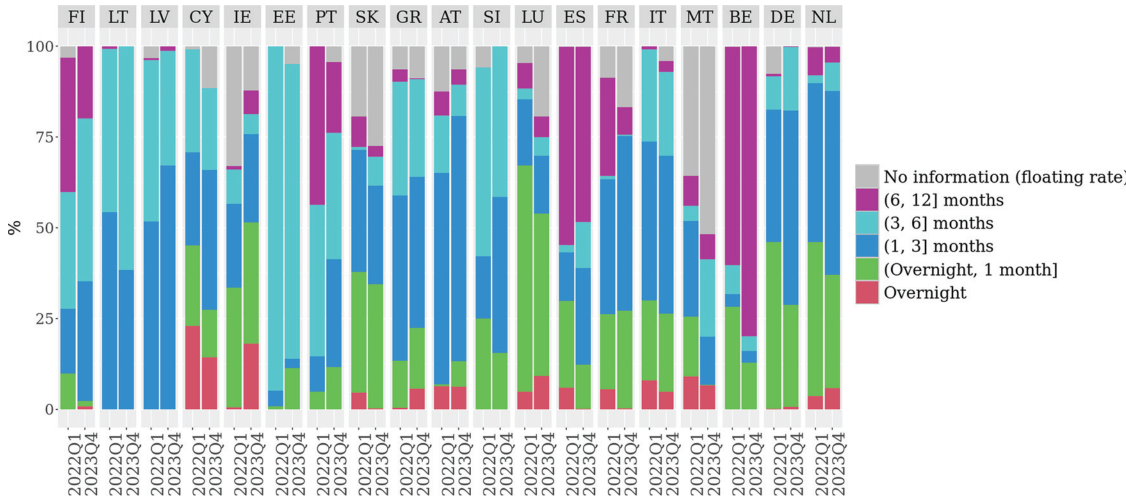
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. The unconditional bar represents the unconditional weighted average, while the conditional bar depicts the weighted average controlling for the firm size category, macroeconomic sector, maturity category, loan type, and cross-border loan dummies (estimated for 2022:Q1 and 2023:Q4 separately; see footnote 15). The horizontal axis represents the country of residence of the bank. Countries are arranged according to the change in unconditional weighted mean interest rate in 2023:Q4 compared with 2022:Q1.

Figure A.6. Structure of Newly Issued Loans to NFCs in Euro-Area Countries by Rate-Type Category, 2022:Q1 and 2023:Q4



Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates in 2022–23. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

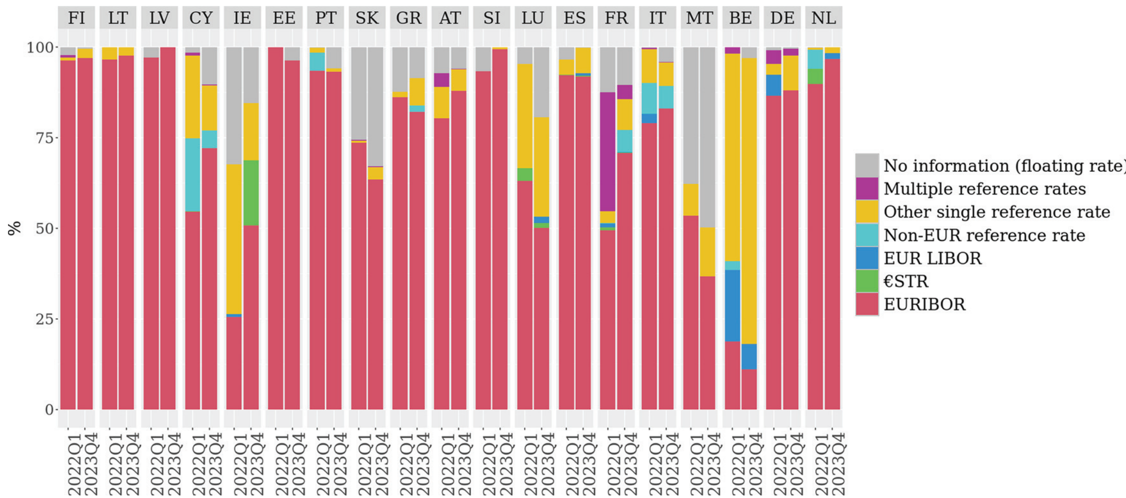
Figure A.7. Structure of Newly Issued Floating-Rate Loans to NFCs in Euro-Area Countries by Reference Rate Maturity, 2022:Q1 and 2023:Q4



Source: AnaCredit.

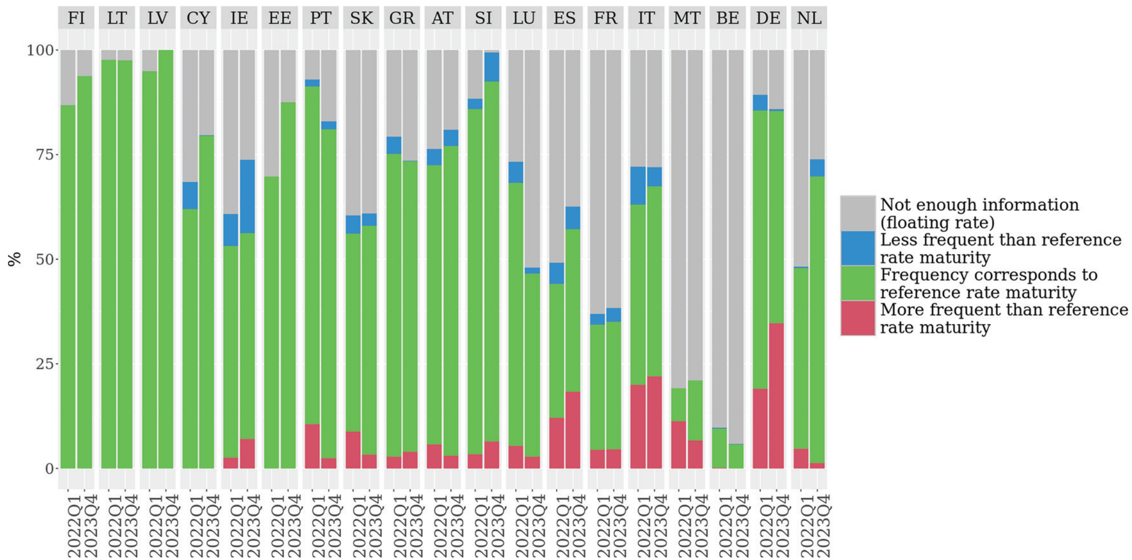
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates in 2022–23. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.8. Structure of Newly Issued Floating-Rate Loans to NFCs in Euro-Area Countries by Reference Rate, 2022:Q1 and 2023:Q4



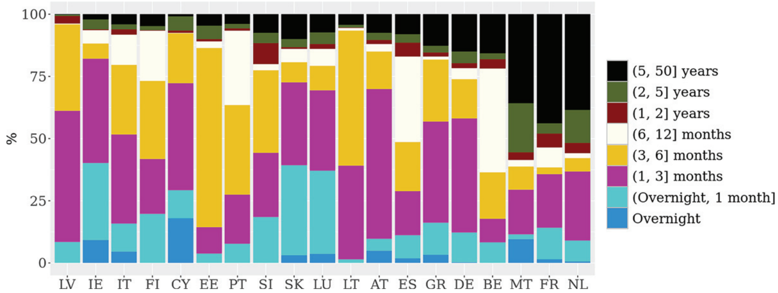
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates in 2022–23. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.9. Structure of Newly Issued Floating-Rate Loans to NFCs in Euro-Area Countries by Correspondence between Frequency of Rate Adjustment and Reference Rate Maturity, 2022:Q1 and 2023:Q4



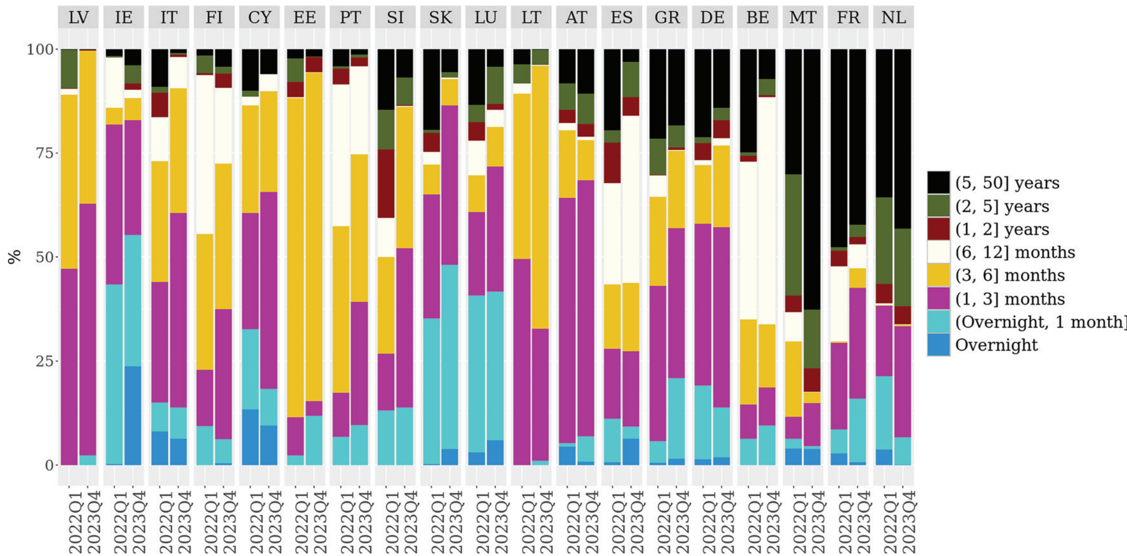
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. Fixed-rate loans have interest rates that remain constant over the entire duration of the loan. Floating-rate loans have interest rates that adjust over time. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the share of new loans with fixed interest rates in 2022–23. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.10. Structure of Newly Issued Loans to NFCs by Maturity of the Relevant Risk-Free Rate in Euro-Area Countries, 2022–23



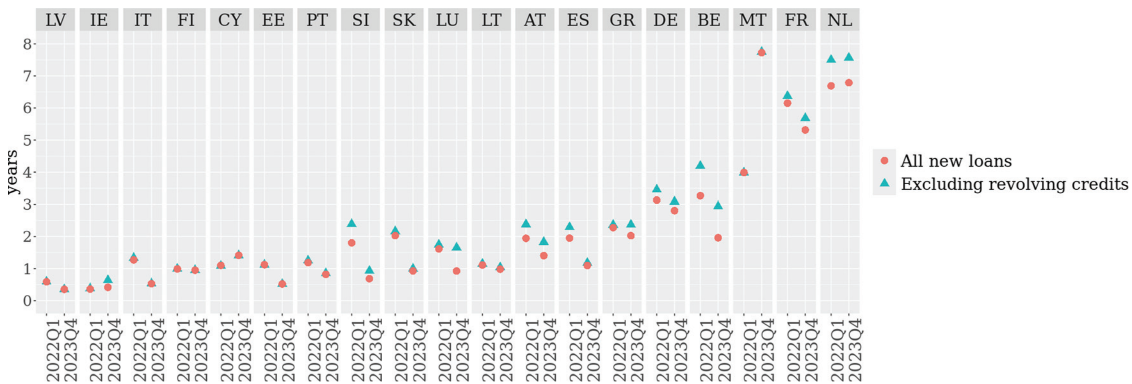
Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022–23, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the weighted average maturity of the relevant risk-free rate. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

Figure A.11. Structure of Newly Issued Loans to NFCs by Maturity of the Relevant Risk-Free Rate in Euro-Area Countries, 2022:Q1 and 2023:Q4



Source: AnaCredit.
Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. Shares are value-weighted. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the weighted average maturity of the relevant risk-free rate. The results for several countries were subject to additional randomization in order to avoid the disclosure of confidential information. In such cases, the figure does not report precise results, though the randomization procedure preserves the overall trends (see footnote 17).

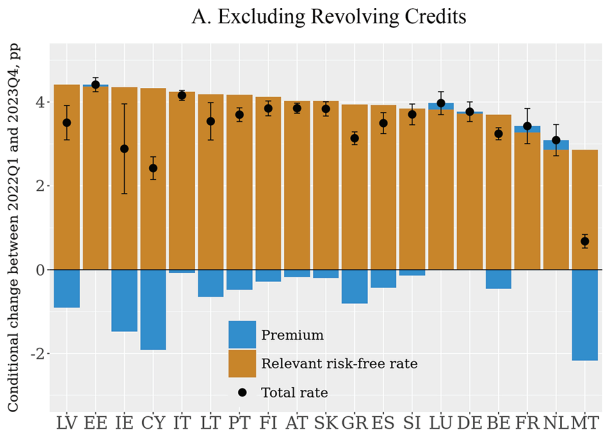
Figure A.12. Weighted Average Maturity of the Relevant Risk-Free Rate for Newly Issued Loans to NFCs in Euro-Area Countries, 2022:Q1 and 2023:Q4

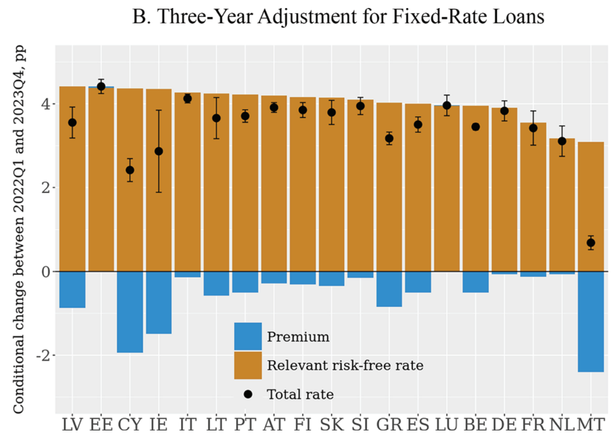


Source: AnaCredit.

Note: New loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the weighted average maturity of the relevant risk-free rate in 2022–23.

Figure A.13. Decomposition of Conditional Changes in the Rates of Newly Issued Loans to NFCs between 2022:Q1 and 2023:Q4, Robustness Checks





Source: AnaCredit.
Note: Points depict the estimated country-specific coefficient $\beta_{1,c}^{loan}$ from Equation (1) that shows the difference in interest rates of new loans issued before and after the monetary tightening and the 95 percent confidence bands. Brown bars show the contribution of changes in the risk-free rate $\beta_{1,c}^{risk-free}$, and blue bars the contribution of changes in the premium $\beta_{1,c}^{premium}$. The sample includes new loans to euro-area NFCs (excluding financial and insurance activities) issued in 2022:Q1 and 2023:Q4, denominated in EUR, exceeding EUR 25,000, with a positive interest rate. The sample consists of the following types of loans: credit lines other than revolving credits, revolving credits, other loans, excluding syndicated loans. For fixed-rate loans, the maturity of the relevant risk-free rate corresponds to the loan's maturity, while for floating-rate loans, it is equal to the maturity of the underlying reference rate. The horizontal axis represents the country of residence of the bank. Countries are arranged according to the contribution of the relevant risk-free rate.

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