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Firm-bank relationships: A cross-country comparison

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Firm-bank relationships: a cross-country comparison

No 2826

Abstract

We document the structure of firm-bank relationships across eleven euro area countries and present new stylised facts using data from the Eurosystem credit registry - AnaCredit. We look at the number of banking relationships, reliance on the main bank, credit instruments, loan maturity, and interest rates. Firms in Southern Europe borrow from more banks and obtain a lower share of credit from the main bank than those in Northern Europe. They also tend to borrow more on short term, more expensive instruments and to obtain loans with shorter maturity. This is consistent with the hypothesis that firms in Southern Europe rely less on relationship banking and obtain credit less conducive to firm growth, in line with their smaller average size. Relationship lending does not translate in lower rates, possibly because banks appropriate part of the surplus generated by relationship lending through higher rates.

Keywords: AnaCredit, Firm-bank relationship, Corporate financing, Bank Credit

JEL codes: G21, G3, G32

Non-technical summary

Banks continue to provide the largest share of financing to the corporate sector in the euro area, despite recent increases in the issuance of corporate securities or credit from other financial intermediaries. The structure of the firm-bank relationship – the cost and the maturity of the funding provided, the collateral requirements and other terms of the credit contracts - matters for firm performance. Relationship lending, in which the firm and the bank develop strong, lasting ties, can increase the quantity and the quality of credit available to firms and alleviate firms' credit constraints, especially when economies are in recessions.

Previous studies have analyzed the characteristics of bank-firm relationships in the euro area, mainly using national data sources, with a limited ability to investigate cross-country differences. The development of AnaCredit, a harmonized credit registry recently developed by the Eurosystem, provides the best instrument to carry-out meaningful cross-country comparisons.

The number of firm-bank relationships varies significantly across firm size and across countries in the euro area. Even though the number of relationships is increasing with firm size in all countries, the absolute numbers differ significantly. Firms in Italy, Spain and Portugal rely more on multiple banks. Large firms in these countries borrow on average from four to five banks. A second group includes Germany, Austria, France, Greece, Finland and Belgium, where the median large firm borrows from two banks. Finally, large firms in the Netherlands and Ireland are closer to the one bank model. Consistently, the extent to which firms rely on the main bank – measured by the share of credit of the main bank over total credit – is highest for firms with fewer banking relationships. These differences remain also for other size classes and also when taking into account sectoral specialization.

Firms' reliance on long-term credit and its maturity also show important differences across countries. In general, long term credit accounts for a larger share of corporate credit in Northern European countries. Moreover, there are important differences in the maturity of credit, although these are more nuanced for smaller firms.

The overall picture suggests that Northern European firms rely more on one bank and on long term instruments, and within these, enjoy longer maturities. This is consistent with the idea that relationship lending is more common in Northern Europe, with the potential advantages in terms of credit quality. The advantages of relationship lending, however, do not translate into lower rates, possibly because banks appropriate part of the surplus generated by relationship lending through higher rates.

The analysis presented in this paper provides a valuable contribution for researchers and policy makers interested in the mechanisms underlying corporate financing and banks' risk-taking in the euro area. Cross-country heterogeneity in bank-firm relationships is structural in the euro area and goes beyond firms' characteristics. This has important implications on the transmission of policies affecting provisions of credit to the corporate sector, including monetary policy.

1 Introduction

Banks still provide the largest share of external financing to the corporate sector in the euro area, despite the recent increases of other sources of financing (from non-bank intermediaries) and other financing instruments, such as corporate bonds.¹ The provision of bank credit establishes a relationship between the lender (the bank) and the borrower (the firm) that can have important implications for firms' performance and the transmission of government and central banking policies. Firms can do business with one or more banks, which imply that they can be more or less resilient to credit supply shocks affecting only some banks. Also, firms can have different types of credit contracts in place with the same bank and use the funding for different purposes, for example to finance inventory or new investment.

Until recently, no homogeneous data existed that allowed to rigorously compare the structure of such relationships across countries and provide an answer to the following questions. How much cross country heterogeneity is there in the tendency to engage in multiple banking relationships? Do firms in different countries borrow on different instruments and at different maturities? Do they pay different interest rates?² In this paper, we fill this gap. We describe the structure of firm-bank relationships for the 11 largest euro area countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. We use AnaCredit, the new harmonized euro area credit registry recently developed by the Eurosystem - the European Central Bank (ECB) and the National Central Banks of the euro area - that covers all bank loans to corporations larger than €25,000. The database was constructed to provide a harmonized reference for bank credit to corporations in the euro area. AnaCredit therefore represents the ideal database to carry out cross country comparisons, typically plagued by issues of data comparability.³

We take 2019 as our reference year and we analyze firm-bank relationships along four dimensions.⁴ First, we look at to what extent firms in different countries tend to rely on

¹For an overview of the recent developments in the financial and corporate sector in the euro area see ECB (2021).

²We are aware of only one paper that carries out a similar analysis in intent, the work by Ongena & Smith (2000), which is based on evidence from a survey conducted in 1996 on 1,079 firms across 20 European countries.

³For further information on the AnaCredit project, see https://www.ecb.europa.eu/stats/money_credit_banking/anacredit/html/index.en.html.

⁴AnaCredit has all information on bank loans starting from September 2018. We do not take the most recent data, because we don't want our analysis to be confounded by the potentially significant effects of the Covid-19 pandemic.

single or multiple banking relationships. Second, we consider the extent to which firms rely on different credit instruments, such as revolving credit (short term) vs. loans (long term). Third, we look at the cross-country maturity of long term credit. Finally, we consider differences in the interest rates. Our goal is to document differences in the firm-bank relationship above and beyond those due to the firm characteristics. For example, small firms tend to borrow from a smaller pool of banks, and small firms are more prevalent in certain European countries than in others. Therefore, it is expected that in those countries the average number of banking relationships should be lower. By conditioning our analysis on firm characteristics, we can control for these effects and single out the supply side determinants of the credit relationship.

Relationship lending, in which the firm and the bank develop strong, lasting ties, can help overcome asymmetric information and therefore increase the quantity and the quality (in terms of maturity, collateral requirements etc.) of credit available to the firm. Consistently, a large body of evidence shows that relationship lending alleviates firm credit constraints.⁵ For example, it is often stated that the German model of the firm-bank relationship is based on a main bank that provides long term financing, helping German firms to fully achieve their growth potential (Harhoff & Körting 1998, Lehmann & Neuberger 2001, Ongena, Tümer-Alkan & v. Westernhagen 2012)). On the contrary, in Italy multiple banking relationships are common even among small firms, possibly because firms want to insure themselves against banks liquidity shocks (Detragiache, Garella & Guiso 2000). Our analysis sheds light on these topics and provides evidence on the reliance of the corporate sector on the funding of one main bank vs. multiple banking relationships across countries.

The number of banking relationships varies significantly across the euro area countries. In particular, we find that three clusters emerge. On the one hand, firms in Italy, Spain and Portugal rely more on multiple banks. Large firms in these countries borrow on average from four to five banks. A second group includes Germany, Austria, France, Greece, Finland and Belgium, where the median large firm borrows from two banks. Finally, large firms in the Netherlands and Ireland are closer to the one bank model. These patterns appear also for the other size classes, as well as when directly accounting for size and sector dummies in a regression framework, indicating that such differences are not accounted by the different industrial structures of EU countries.

⁵See Degryse, Kim & Ongena (2009) for a survey and Kysucky & Norden (2016) for a meta-analysis of the effects of relationship lending on access to credit in general. Beck, Degryse, De Haas & Van Horen (2018) show that relationship lending is particularly important during recessions, when firms need credit the most.

Consistently, we find that the extent to which firms rely on the main bank – measured by the share of credit of the main bank over total credit – is lowest for the first cluster and highest for the third. The extent on which a firm relies on the credit from its main bank is a measure of how strong the firm-bank relationship is. Recent evidence shows that the strength of the firm-bank relationship can mitigate the credit contraction arising from shocks affecting the lenders and overall have a beneficial effect on firms' investment and employment (Gobbi & Sette 2013, Sette & Gobbi 2015, Banerjee, Gambacorta & Sette 2017), suggesting that cross-country differences documented in this paper could be correlated with firm level performance.

We then analyze the instruments through which firms obtain credit, distinguishing between loans, non-revolving credit lines, leases, trade receivables and revolving credit.⁶ First, we find that, across countries, loans and non-revolving credit lines, both long term instruments, are substantially cheaper than other forms of credit. For example, the overall average rate on loans and non-revolving credit lines is just above 2%, while that on revolving credit is around 5%. This implies that cross country differences in the reliance on different instruments will affect the overall cost of credit for firms. And in fact, we find that reliance on long term credit varies between more than 80% in France to less than 60% in Greece, Italy and Ireland. In general, long term credit accounts for a larger share of credit in Northern European countries.⁷

Next, we look at the maturity of the long term instruments, loans and non-revolving credit lines. We find very large cross country differences in average maturity. If we look at large firms, Dutch firms borrow at the longest maturity (15 years) while Irish firms have the shortest maturity (5 years). This indicates that the main bank model, which is prevalent in these two countries, can result in very different maturity for long-term credit. For other countries, the North vs. South clusters are confirmed, with large Greek, Spanish, Italian and Portuguese firms displaying lower maturity. The results are however more nuanced when we look at smaller firms, and indeed we find that, overall, the maturity does not vary systematically with size. In term of countries, the overall picture is confirmed, the main difference being that Greek and Spanish SMEs show average maturity more similar to

⁶Non-revolving credit lines are similar to loans, with the difference that the funds are given in pre-established tranches over time, rather than all at once.

⁷Consistent with our result, Feraboli, Häkkinen & Gutiérrez (2015) show that firms in countries more affected by the Great Financial Crisis have a higher share of short-term credit compared to firms in countries that were less affected.

Northern European countries.

Finally, we consider the interest rate. Here, the more striking result is the large cross country difference in the average interest rate. For large firms, we find that Greek and Irish firms pay the highest rates, between 6% and 5%, followed by the Netherlands (4%). Large firms in the other countries pay more similar rates, around 2%. These patterns are broadly confirmed for other size classes and for the overall distribution. Moreover, controlling for size and sector effects changes the distribution only marginally, indicating that the differences are due to some country attributes rather than to differences in the firm characteristics.

To dig further into these differences in interest rates, we perform three shift-and-share exercises according to size, sector, and reliance on different credit instruments. These exercises allow us to determine how much of the observed cross country difference in average rates is due to differences in the distribution of firm characteristics and instrument type and how much to differences within firm type or instrument type average rates. We find that size and sector effects play only a marginal role. Some more action emerges in terms of type of instrument. In particular, in Greece, Ireland, Austria, and Italy the average interest rate is between 30 and 50 basis points higher than what would have been if firms in these countries had the same share of credit by instrument type as the overall average. These are in fact the countries that rely more on more expensive, short term instruments. For all decompositions, the within component remains the dominant factor, indicating that country effects play a predominant role in determining cross country heterogeneity in interest rates.⁸

To summarize, the overall picture suggests that Northern European firms rely more on one bank, more on long term instruments, and within these, enjoy longer maturities. This is consistent with the idea that relationship lending is more common in Northern Europe, with the potential advantages in terms of credit quality. Of course, this is a rough representation of a very complex picture, in which there are several exceptions. Possibly, the most noticeable one is Ireland, where firms tend to heavily rely on a single bank but with credit outcomes more similar to those of countries in which multiple banking relationships are more common. The advantages of relationship lending, however, do not translate into lower rates. In fact,

⁸In this paper, we do not investigate potential explanations of the cross-country differences on the interest rates, as the main focus is to document those. Differences on the interest rates across countries are described also by the OECD. (2022) report, where issues with access to credit is highlighted as a key explanatory factor. Feraboli et al. (2015) show that the monetary policy pass-through during the low interest rates period was much more sluggish for countries more affected by the financial crisis and thus led to higher interest rates for firms in these countries compared to firms in countries in the euro area less affected by the financial crisis.

we find no clear divide along this dimension. This might be explained by the fact that, as theory suggests, the main bank extracts part of the surplus that the relationship creates by charging higher rates (Rajan 1992).

The analysis presented in this paper provides a valuable contribution for researchers and policy makers interested in the mechanisms underlying corporate financing and banks' risk-taking in the euro area. On the one hand, the evidence presented corroborates some of the patterns unveiled in previous literature, mostly based on one country evidence. Leveraging on a completely harmonised database, we show that cross-country heterogeneity in bank-firm relationships is structural in the euro area and goes beyond firms' characteristics. This has important implications on the transmission of policies affecting provisions of credit to the corporate sector. For example, Jiménez, Ongena, Peydró & Saurina (2012) analyze the transmission of monetary policy shocks using data on firm-bank relationships from Spain. They show that the probability for a firm to be granted a loan is significantly impacted by the number of firm-bank relationships. Therefore, firms with multiple bank relationships are less affected by monetary policy shocks and also by the financial conditions of the lending banks. At the same time, Degryse, De Jonghe, Jakovljević, Mulier & Schepens (2019) point out that in order to correctly evaluate the transmission of credit shocks, it is important to consider the structure of credit markets in each country and appropriately include the effects on single bank-firm relationships. We also unveil important features of within-country heterogeneity in corporate financing, such as the dispersion in the number of firm-bank relationships, and compare them across euro area countries.

The rest of the paper is organized as follows. In Section 2 we describe the data, while Section 3 analyzes the number of firm-bank relationships and the reliance on the main bank. Section 4 studies the type of credit instruments, Section 5 looks at maturity and Section 6 analyzes the interest rate. Section 7 concludes.

2 Data

The core dataset of this analysis comes from the harmonized credit registry of the euro area, AnaCredit, that contains confidential loan-by-loan information on bank credit to enterprises.⁹

⁹AnaCredit reports all loans granted by credit institutions residing in euro area Member States, including loans granted by their domestic / foreign branches. The data is maintained by the ECB and the Eurosystem National Central Banks and is harmonized across Member States. A credit instrument is subject to reporting

The purpose of our analysis is to identify structural cross-country differences in bank-firm relationships in the euro area. Thus, we focus on the cross-section and restrict the data only to December 2019.

2.1 AnaCredit

For the purpose of this analysis, we restrict our sample to credit granted to non-financial corporations residing in Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain. Together, these countries account for approximately 95% of euro area nominal gross domestic product (GDP) in 2019,¹⁰ and 97.0% of the total outstanding bank credit in the euro area at the end of 2019.¹¹

To carefully restrict the analysis to non-financial corporations,¹² we exclude all firms operating in financial services, insurances and pension funds, and activities auxiliary to financial services and insurance activities (NACE codes 64–66). Moreover, to ensure that we compare similar firms in terms of credit risk across countries, we exclude firms that are in default. This is because firms in default are typically engaged in complex debt write-offs and transfers, which involve different banking relationships. Thus, we exclude all firms which either defaulted on any of their active loans in December-2019, or were classified as in default with any of its creditors in December-2019.¹³

Next, to accurately estimate the number of firm-bank relationships, we omit firms that have active syndicated loans in December 2019 and we exclude all loans associated with multiple creditors. This is because only the euro area credit institutions are recorded for syndicated loans in AnaCredit, independent of the reporting agent's role as lead arranger or agent. Thereby, the actual number of all banks involved in the syndicate is not available through AnaCredit.

if the borrower is a legal entity, and if the total commitment amount at the creditor-debtor level is greater or equal to €25.000 at any point within the reference period. Counterparties operate across all institutions and reside globally, although for the purpose of this study we focus only on euro area borrowers. The data is available at monthly frequency, beginning in September 2018.

¹⁰Calculations are based on Eurostat data, GDP at current market prices.

¹¹The calculation is based on our final data set including all applied filters. The reference period for our analysis is December 2019, but our results are robust to the selection of previous or subsequent reference periods.

¹²Non-financial corporations are defined using the ESA 2010 classification equal to S.11

¹³Default can arise either due to the unlikelihood to pay, to past-due of more than 90/180 days, or to both.

We perform the analysis at the bank, rather than the banking group level. We choose to use the bank level information because entrepreneurs deal directly with a bank and not a group. For example, loan officers from different banks within the same group are not generally expected to share information on single customers.

At the instrument level, we exclude all instruments classified as reverse repurchase agreements and deposits because these are complex financial instruments usually linked to a financial subsidiary of a corporation. We also exclude loans flagged as ‘Project Finance’ since these are associated with large infrastructure projects with multiple creditors. To simplify the analysis on the credit type, we group the remaining instrument types into five categories: (1) loans; (2) financial leases; (3) trade receivables; (4) credit lines; and (5) revolving credit, where revolving credit captures overdrafts, credit card debt, and revolving credit other than overdrafts and credit card debt.

Finally, to ensure comparability across products, we restrict the analysis to loans granted in EUR, which corresponds to 84.0% of all instruments in December 2019. At the instrument level, we further winsorize outstanding and commitment amounts at the 0.01% level.

To ensure the data quality of the sample, we apply a number of filters on debtor and instrument level. On debtor level, we exclude values that exceed or are equal to the 0.01% level for the number of employees, annual turnover, and balance sheet total. On instrument level, we exclude values of the outstanding amounts below or equal to 0 and above or equal to the 0.01% level in the empirical distribution.¹⁴ The final sample consists of 2,737,561 firms that received loans from 2,482 banks.

To classify debtors according to firm size, we proceed in three steps. First, we combine information on the balance sheet size, number of employees, and annual turnover at the unconsolidated firm-level in AnaCredit. Second, for these firms that do not have any information available in AnaCredit, we link AnaCredit to Bureau van Dijk’s Orbis to incorporate external firm-size characteristics. We link AnaCredit to Orbis using the firm’s RIAD code and national identifier. Finally, for these firms without individual information on firm characteristics neither in AnaCredit nor in Orbis, we utilize the enterprise size as defined in AnaCredit.

¹⁴This threshold ensures that clearly implausible data points are discarded without significantly restricting the data coverage.

We categorize firms into four size classes: micro, small, medium, and large. Following the official definition of the European Union,¹⁵ firms are classified as micro if they have less than 10 employees, and either have total assets or annual turnover less than EUR 2 million. Small firms have less than 50 employees, and either have total assets or annual turnover less than EUR 10 million. Medium-sized firms have less than 250 employees, and either have total assets less than EUR 43 million or annual turnover less than EUR 50 million. The remainder are classified as large firms. We describe the procedure in detail in Appendix B.

2.2 Summary statistics

Table 1 presents the summary statistics of the main variables for each size class for the whole sample.¹⁶ The sample of the large firms consists of 42,609 firms, the medium of 144,204 firms, the small of 593,337 firms, and the micro of approximately 2 million firms. Based already on the aggregate summary statistics, it is evident that there is a significant difference on the firm-bank relationships across firm size. Larger firms on average borrow from more banks, while the share of credit used from the main bank is decreasing with firm size - smaller banks are more dependent on the funding of their *main bank*. Moreover, the cost of bank credit, measured as the average interest rate of the loans, is lower for larger firms. As expected, the total amount outstanding, the number of employees, the total size of the balance sheet, and the annual turnover of the firm are increasing with firm size. We analyze the cross country differences in firm-bank relationships as well as the terms of credit received in detail in the rest of the paper.

In the Appendix Table A12, we also report the summary statistics of outstanding amounts for instrument type by firm size. The last column shows the share of firms that use each instrument. The vast majority of firms uses loans and revolving credit, with micro firms to have the highest share of loans. As expected, the median values of outstanding amounts are increasing with firm size.

¹⁵https://ec.europa.eu/growth/smes/sme-definition_en

¹⁶Appendix Tables A1-A11 report the same information separately by country.

Table 1: Summary statistics by size

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	42,609	132	1,103	9,000	15,091
Number of banks	42,609	1	2	4	3
Share from main bank	42,609	0.55	0.90	1.00	0.77
Interest rate (%)	39,134	0.78	1.52	2.63	2.09
Maturity (in years)	27,234	4.17	6.57	11.36	8.50
Number of employees	37,009	167	330	626	3,013
Balance sheet total (in thousands)	35,813	17,899	65,750	170,000	574,186
Annual turnover (in thousands)	38,070	9,132	63,300	150,974	8,194,879
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	144,204	130	705	2,888	3,226
Number of banks	144,204	1	2	4	3
Share from main bank	144,204	0.58	0.96	1.00	0.80
Interest rate (%)	135,238	0.99	1.71	2.83	2.26
Maturity (in years)	104,914	4.10	6.30	10.30	8.05
Number of employees	132,921	52	70	108	83
Balance sheet total (in thousands)	124,685	1,934	8,768	17,484	21,620
Annual turnover (in thousands)	125,064	791	8,000	19,025	64,984
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	593,337	69	229	707	824
Number of banks	593,337	1	2	3	2
Share from main bank	593,337	0.67	1.00	1.00	0.84
Interest rate (%)	565,804	1.25	2.07	3.38	2.65
Maturity (in years)	450,580	4.12	6.02	10.18	7.95
Number of employees	562,694	11	15	24	18
Balance sheet total (in thousands)	528,375	408	1,452	3,250	4,512
Annual turnover (in thousands)	517,446	75	1,255	3,075	51,049
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	1,957,411	37	89	228	302
Number of banks	1,957,411	1	1	1	1
Share from main bank	1,957,411	1.00	1.00	1.00	0.93
Interest rate (%)	1,861,200	1.44	2.30	3.76	2.92
Maturity (in years)	1,529,970	5.00	7.07	14.18	9.57
Number of employees	1,510,323	1	2	4	3
Balance sheet total (in thousands)	1,500,110	131	328	710	1,309
Annual turnover (in thousands)	1,491,672	48	202	489	32,562

Note: The differences in the number of observations stem from the data availability for firms and instruments. The data on maturity includes only long-term credit (loan and non revolving credit lines).

2.3 Credit contracts

Firms borrow using different instruments, which differ in terms of maturity, collateral and revolving nature. A revolving instrument is one in which the bank guarantees credit up to a certain pre-set amount and the firm can, up to that amount, increase and decrease exposure as needed. Instruments can be grouped in five broad categories:

1. **Loans.** This instrument includes all loans and advances as well as bills not included in any of the other categories. Any instrument classified as other loans is of a non-revolving nature. This type of instrument includes lump-sum credits (where the total credit is paid out in one installment).
2. **Non revolving credit lines.** Non revolving credit lines have the following features: (a) the debtor may withdraw funds up to a pre-approved credit limit without giving prior notice to the creditor; (b) the credit may be used in tranches; (c) it is not of a revolving nature (i.e., the amount of available credit can only decrease as funds are drawn and repaying funds does not increase the available amounts).
3. **Trade receivables.** The type of instrument “trade receivables” includes loans granted on the basis of bills or other documents that give the right to receive the proceeds of transactions for the sale of goods or provision of services. This item includes all factoring transactions (both with and without recourse) as well as forfaiting and discounting of invoices, bills of exchange, commercial papers, and other claims on the condition that the credit institution buys the trade receivables. Note that the instrument “trade receivables” is distinguished from financing against trade receivables. While “trade receivables” means purchasing trade receivables (the factoring client sells the trade receivables), in financing against trade receivables the credit institutions typically advance funds against a pool of receivables which serve as protection. In other words, financing against trade receivables is an instance of credit that involves the use of the trade receivables as collateral.
4. **Financial leases.** A financial lease is a contract under which the lessor as legal owner of an asset conveys the risks and benefits of ownership of the asset to the lessee. Under a financial lease, the lessor is deemed to make, to the lessee, a loan with which the lessee acquires the asset. Thereafter, the leased asset is shown on the balance sheet of the lessee and not the lessor; the corresponding loan is shown as an asset of the lessor

and a liability of the lessee. The lessor is recorded as the creditor to the instrument whereas the lessee is the debtor to the instrument. The leased asset is usually used as protection.

5. **Revolving credit.** The revolving credit instrument includes (a) overdraft, (b) credit card debt, and, (c) revolving credit other than overdrafts and credit card debt. All these instruments are revolving and for that reason we grouped those under one instrument.

Loans and credit lines are typically used to finance long term investments, the main difference being that a loan is given out lump-sum while the credit line allows the firm to withdraw in tranches. Therefore, these instruments are used to finance projects that imply payments staggered in times. We define the firm-level average maturity of instrument j as:

$$m_{ijc} = \sum_b \omega_{ijbc} m_{ijbc} \quad (1)$$

where m_{ijbc} is the maturity at origination of credit instrument j that bank b extends to firm i in country c , $\omega_{ijbc} = \frac{ON A_{ijbc}}{ON A_{ijc}}$ and $ON A_{ijc} = \sum_b ON A_{ijbc}$ is the total credit firm i obtains through instrument j . ONA stands for outstanding nominal amount of the credit granted and we use this abbreviation throughout the paper. We classify loans and credit lines as long term instruments. Trade receivables are used to cash in on yet-to-be-paid bills, and as such they are a short term source of liquidity. The instrument is largely used to finance working capital, as well as import and export. Finally, revolving instruments provide firms with short term liquidity and are typically used to finance working capital and liquidity shocks. They have no maturity, as by contract they can be revoked by the bank with no prior notice.

2.4 Interest rate definition

Firms borrow from multiple banks and use different instruments. Moreover, a firm can have different contracts for the same type of instrument from the same bank, such as two loans issued at two different dates. We proceed by aggregating the granular instrument level information to obtain a meaningful measure of the cost of credit for the firm. First, we aggregate the data at the firm-bank-instrument level by taking the weighted interest rate on each contract of a given instrument, weighted by the size of each contract. Our basic interest rate observation is therefore r_{ijbc} , that is, the interest rate that firm i pays on instrument j from bank b in country c , with $ON A_{ijbc}$ being the corresponding outstanding nominal

amount. Next, we aggregate at the borrower level and we take all credit a firm obtains on instrument j from all banks and construct the firm-instrument level interest rate as:

$$r_{ijc} = \sum_b \omega_{ijbc} r_{ijbc}. \quad (2)$$

where $\omega_{ijbc} = \frac{ON A_{ijbc}}{ON A_{ijc}}$ and $ON A_{ijc} = \sum_b ON A_{ijbc}$ is the total credit firm i obtains through instrument j . In each period, a firm will have at most five different values of r_{ijc} , one for each instrument it uses.

The next level of aggregation is at the firm level, and we construct the firm level interest rate as:

$$r_{ic} = \sum_j \omega_{ijc} r_{ijc} \quad (3)$$

where $\omega_{ijc} = \frac{ON A_{ijc}}{ON A_{ic}}$ and $ON A_{ic} = \sum_j ON A_{ijc}$ is the total credit firm i obtains through all instruments.

It is well known that large firms pay lower rates. This relationship is confirmed in the AnaCredit data. Figure 1a plots the distribution of the interest rate by firm size for the whole sample of firms, that is, without distinguishing by country. There is a clear declining trend when going from micro to large firms. The variation is however not large: the average rate for micro firms is 2.92%, and it drops to 2.09% for large firms (with basically no differences with medium firms).¹⁷

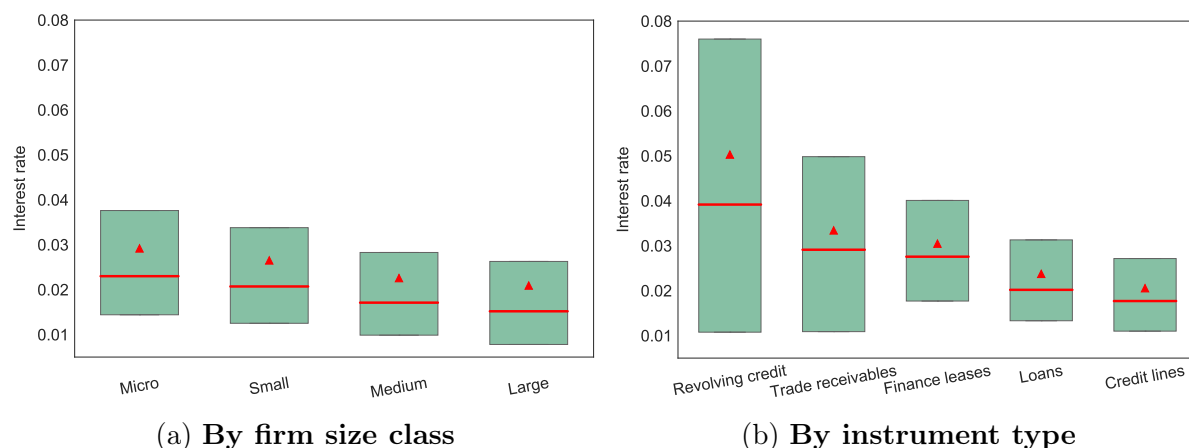
Different instruments also command different rates, as shown by Figure 1b. In this case differences are more pronounced, with revolving credit (5.03%) costing on average twice as much as loans and credit lines, as well as being substantially more dispersed than the other instruments. Interest rates on trade receivables and leases are slightly above 3%, while rates on loans and credit lines are equal to 2.37% and 2.06%, respectively.

3 Number of firm-bank relationships and reliance on the main bank

Theory suggests that firms might want to entertain more than one bank relationship both for insurance reasons – to be able to access credit from multiple sources in case one or more banks

¹⁷For reference, the monetary policy rates in the euro area at the end of 2019 were -0.5 for the deposit rate, 0 for the MRO and 0.25 for the MLR.

Figure 1: **Interest rates**



Note: The figure shows the distribution of interest rates. The box plot's bars depict the interquartile range, the red line indicates the median and the red triangle the average interest rate. The bars are arranged in descending order according to the average interest rates. The sample period is December 2019.

run into liquidity problems (Detragiache et al. 2000) – and to increase their bargaining power against banks (Rajan 1992). At the same time, multiple relationships might induce a “free riding” problem on banks, according to which none of them has sufficient incentives to invest in information production to reduce asymmetric information. In fact, relationship lending is based on the main bank model, in which a firm mostly borrows from a single bank, forming a strong tie that allows to reduce the extent of asymmetric information. The prevalence of a model in which firms rely more or less on multiple bank relationships ultimately should depend on the tradeoff between the benefit of greater diversification and the costs of free-riding problems and duplication of efforts (Carletti, Cerasi & Daltung 2007). In this section we describe how the nature of the firm-bank relationship varies across countries, focusing on the number of banks a firm borrows from, the share of credit supplied by the main bank and credit concentration across the different firm's lenders.

3.1 Number of firm-bank relationships

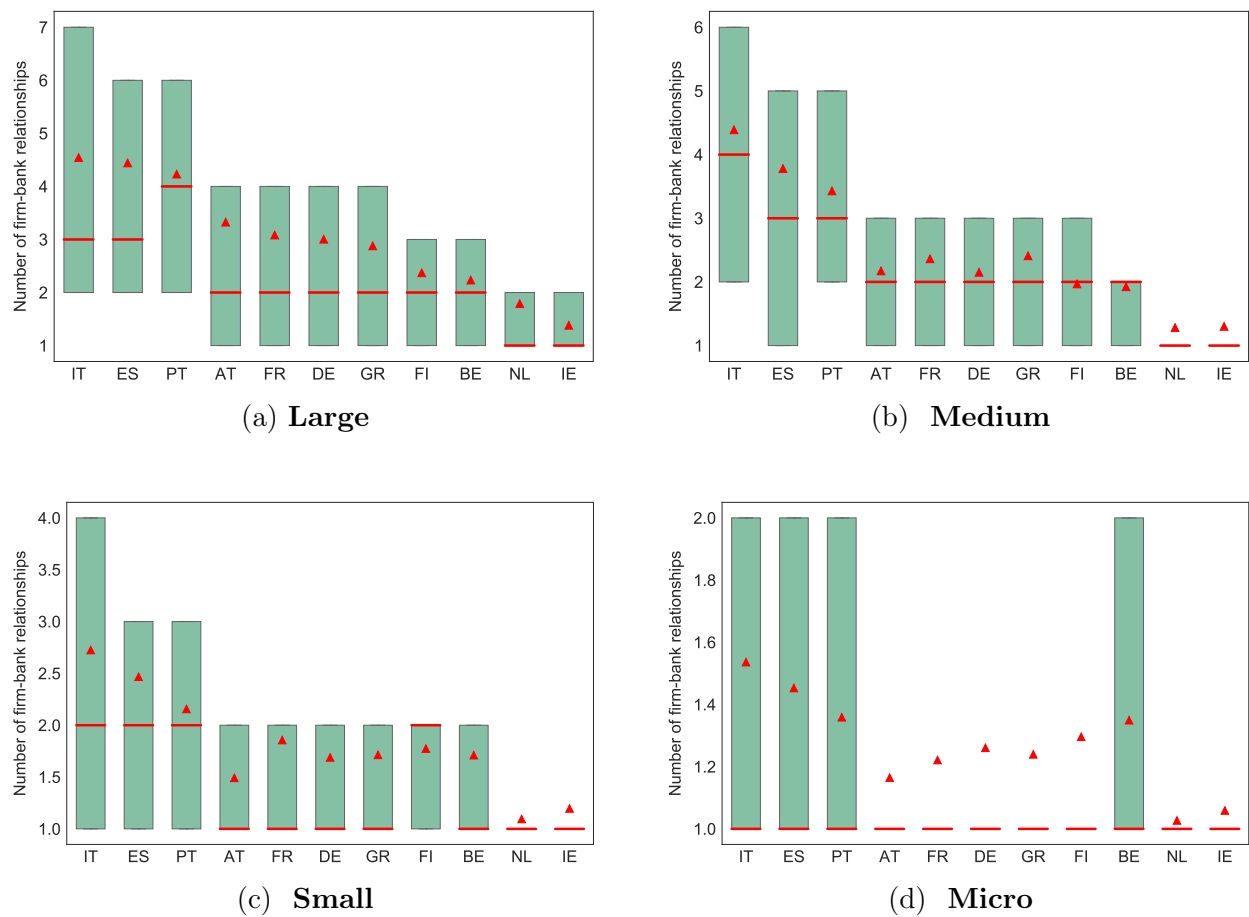
First, we analyze the number of banks firms borrow from. Given that a firm is in AnaCredit only if it borrows from at least one bank, our statistics refer to the intensive margin, that is, the number of relationships conditional on having at least one. Figure 2 reports box plots of the distribution of the number of banks separately by firm size and country. We

rank countries in descending order in terms of the average number of banks for large firms and keep the same ranking in all four panels. For large firms (Panel 2a), three groups of countries emerge. Firms in Italy, Spain, and Portugal have the largest number of banks, with an average between 4 and 5, a median between 3 (Italy and Spain) and 4 (Portugal) and the 75th percentile between 6 and 7. A second group includes Germany, Austria, France, Greece, Finland, and Belgium, where the median firm borrows from 2 banks (the mean is around 3). Finally, large firms in the Netherlands and Ireland follow the one bank model: the median is 1, the 75th percentile is 2 and the mean is between 1 and 2. This ranking also holds in terms of dispersion: the interquartile range (the difference between the 75th and the 25th percentile) is 5 in Italy, 4 in Spain and Portugal, 3 or 2 in the intermediate cluster, and just 1 in Ireland and the Netherlands.

Not surprisingly, Panel (b), (c) and (d) of Figure 2 show that the number of firm-bank relationships decreases monotonically with size in all countries. However, the three-clusters pattern described above emerges in all size classes. For the first cluster, the ranking of Italy, Spain, and Portugal is also confirmed in all size classes. The second cluster shows very similar values across countries, with an average of 3 for medium firms, 2 for small and 1.3 for micro. With the exception of Finland, the median small firm in this cluster borrows only from 1 bank. The fact that the average is closer to 2 implies that there is a long tail of firms entertaining multiple relationships with banks. The Netherlands and Ireland always display low and similar values: in all size classes the one bank model is prevalent. The fact that we obtain similar patterns in all size classes supports the notion that there are important cross-country structural differences in the determination of the number of banks a firm borrows from.

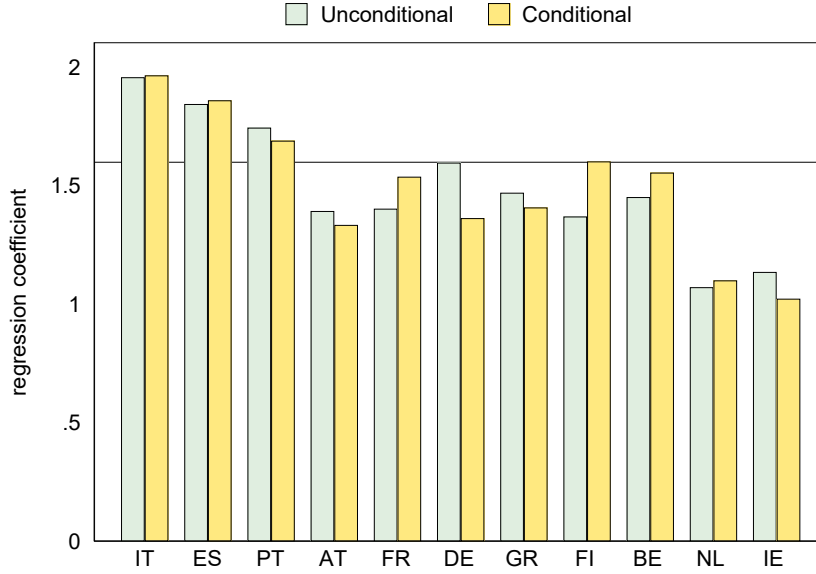
To obtain a summary measure of the cross country differences, in the first bar of Figure 3 we plot the overall average number of relationships, that is, without distinguishing by size class. We keep the same ranking as in Figure 2. The overall average, between 1 and 2 in all countries, resembles that of small and especially micro firms, as they represent the vast majority of firms and therefore substantially affect the mean. The three clusters of countries are again confirmed. At one extreme, Italian firms have almost two relationships on average, while at the other extreme, Irish and Dutch firms have approximately around 1.1 relationships. Within the middle cluster, the ranking is slightly different from the one based on large firms: in particular, German firms display the highest value, followed by Greek firms.

Figure 2: Number of bank relationships by firm size



Note: The figure shows the firm-bank relationship distribution by country and firm size. The number of relationships is calculated at the firm level. The box plot's bars depict the interquartile range, the red line indicates the median and the red triangle the average number of relationships. Countries are ordered by descending average number of relationships of large firms. The sample period is December 2019.

Figure 3: Average number of bank relationships



Note: The figure reports the average number of banks a firm borrows from. The Unconditional bar represents the unconditional average, while the Conditional one represents the average controlling for size and sector dummies as specified in Equation 4. The horizontal line represents the overall average. Country order of large firms is kept.

One issue with the mean plotted in the first bar of Figure 3 is that it mixes a country attribute (the firm propensity to develop multiple relationships) and firm characteristics. It is well known that both the firm size distribution and sectoral specialization differ systematically across European countries (Pagano & Schivardi 2003). As shown above, smaller firms on average borrow from a lower number of banks. Sectoral specialization might also induce different borrowing patterns. For example, due to the sectoral differences in the importance of tangible assets, some sectors tend to rely more on debt financing (Falato, Kadyrzhanova, Sim & Steri 2020). To account for this, we estimate the following regression specification:

$$\text{Nrel}_{isgc} = \sum_{c=1}^{11} \alpha_c^N D_c^{\text{Ctry}} + \sum_{g=1}^4 \beta_g^N D_g^{\text{Size}} + \sum_{l=1}^{20} \gamma_s^N D_s^{\text{Sect}} + \epsilon_{isgc} \quad (4)$$

where Nrel_{isgc} is the number of bank relationships entertained by firm i in sector s , size class g and country c , D_c^{Ctry} is a dummy equal to one if firm i belongs to country c and similarly for the four size classes and the twenty sector dummies. We omit the constant to retrieve all coefficients of the country dummies, α_c^N , which represent the *conditional* means, that is, conditional on size and sector effects. To retain comparability with the unconditional

mean, we normalize the values so that the overall conditional mean is equal to the overall unconditional mean.¹⁸ Controlling for firm characteristics changes the position of some countries in the ranking (Figure 3). Specifically, the conditional mean for Germany decreases (from 1.59 to 1.36), consistently with the fact that German firms are on average larger, so that the number of relationships decreases once we account for size. To a lower extent, the same holds for Austria, Greece, Ireland, and Portugal. At the other end, Finland records the largest increase (from 1.36 to 1.59), followed by France and Belgium. The values are almost identical for the other countries. In general, the differences between the conditional and the unconditional mean are small. This indicates that cross-country differences in the propensity of firms to entertain multiple banking relationships are mostly explained by some country attributes rather than by differences in the size or sectoral composition of firms. Stated differently, Italian and Spanish firms have on average almost twice as many relationships as Dutch and Irish firms also when accounting for sectoral and size differences.

3.2 Reliance on the main bank

Having established that there are substantial differences in the number of relationships across countries, we now check if they translate into differences in the extent to which firms actually rely on a plurality of banks. In particular, it could be that firms in the first cluster of countries nominally borrow from more banks, but actually they mostly operate with a single bank, keeping the other relationships in place for insurance reasons. To assess this, we first consider the share of credit a firm gets from the “main bank”, defined as the bank which accounts for the largest share of the outstanding credit. We consider the outstanding amount, that is, the credit that a firm is actually using (as opposed to the granted amount, which includes unused commitments).

Figure 4 reports the box plots for the share of credit from the main bank, by firm size and country. As for the number of relationships, we rank the countries from highest to lowest average value of large firms. The pattern of three clusters is broadly confirmed, despite some small differences. For large firms (Panel 4a), the average amount supplied by the main bank

¹⁸In fact, the regression drops one size and one sector dummy, so that the country dummy refers to that size-sector cell. Of course, the choice of the excluded sector and size class affects the absolute values of the α_c but not the cross country differences $\alpha_{c_1} - \alpha_{c_2}$. We re-base the coefficients by subtracting the average of the conditional country dummies $1/n \sum_c \alpha_s$ and adding the average unconditional country means, so that by construction the overall country mean is equal for the conditional and unconditional means.

is around 0.7 for Italy, Spain, and Portugal, the lowest values, in accordance with the results on the number of banks. In the second cluster, the average value is around 0.8, with Greece and France recording the lowest values and Finland the highest. The average large firm in the Netherlands and Ireland borrows more than 90% of its credit from the main bank.

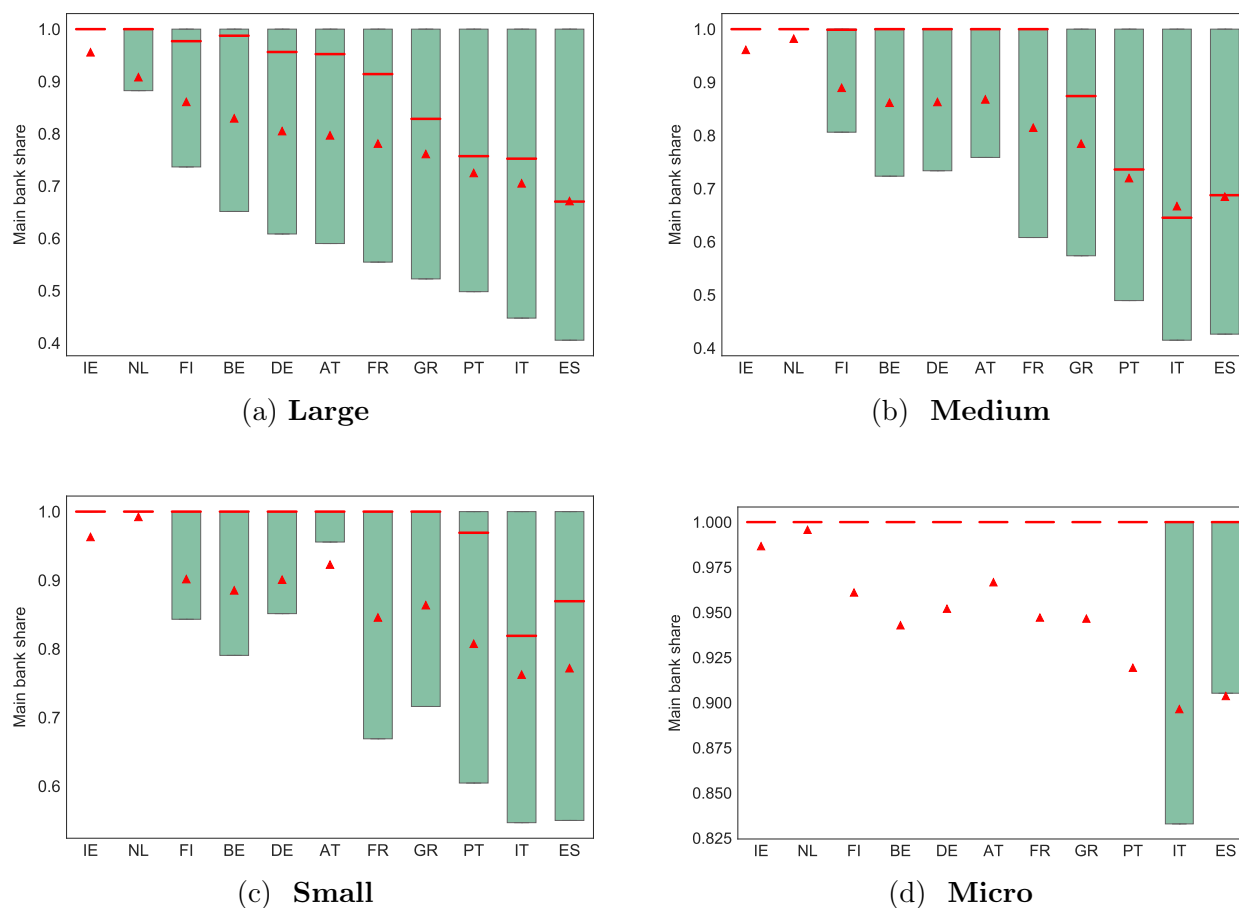
The mean masks more marked differences in the distribution. In particular, in Austria, Belgium, Finland, France, Germany, Ireland, and the Netherlands, the distribution is left-skewed and the median is substantially higher than the mean; the median firm borrows more than 90% of the total amount from the main bank, while the figure is 70%-80% in Greece, Italy, Portugal, and Spain. This means that, despite a long left tail of firms that do not concentrate their credit demand on one bank, most of the firms in Northern European countries tend to heavily rely on one bank. Firms in Southern countries are also characterized by a higher dispersion in reliance on the main bank, as shown by the higher values of the interquartile range.

The general patterns found for large firms are confirmed for other size classes. The overall values for medium firms are very similar to those for large ones. In this size class, the median firm in all countries but Italy, Greece, Portugal, and Spain borrows only from the main bank. Irish and Dutch medium firms basically draw all their credit from one bank. The share of credit of the main bank increases somehow for small firms, but remains below 80% at the mean for Italy, Portugal, and Spain. In these countries, even micro firms on average borrow only around 90% of the total amount from the main bank.

As for the number of relationships, we also report the average value of credit from the main bank at the country level in Figure 5, both unconditional (left bar) and conditional on size and sector fixed effects. The clusters also emerge clearly in this case. Moreover, as before, controlling for firm characteristics only induces some visible changes in the ranking for Germany and Finland, while for other countries the two means are very similar. This confirms that cross country differences in the firm-bank relationship and the reliance on funding from the main bank is dictated more by country attributes and less by differences in firm size and sectoral characteristics.

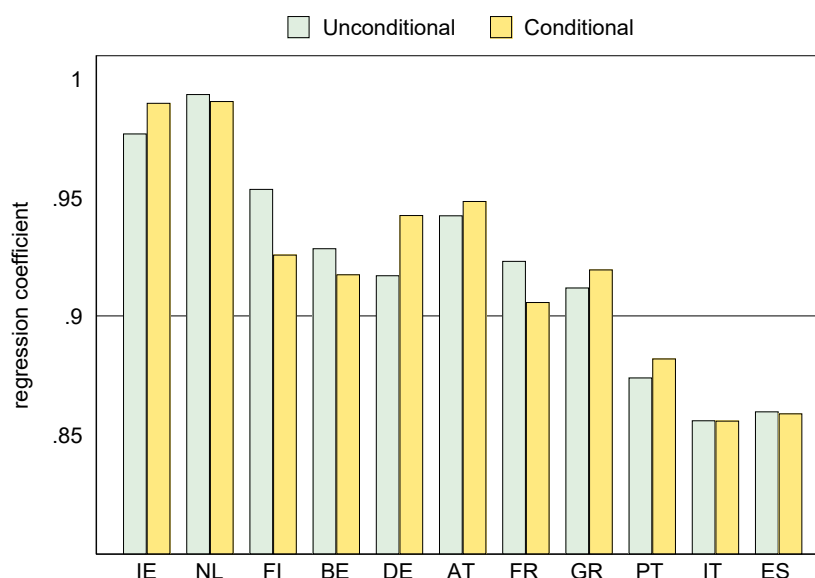
As a further indicator of reliance on multiple banking relationships, we calculate the Hirschman-Herfindahl index (HH) to measure credit concentration across banks. The indicator is defined as $HH_i = \sum_{b \in i} \left(\frac{\text{credit}_{ib}}{\text{credit}_i} \right)^2$, where $b \in i$ is the set of banks that lend to firm i , credit_{ib} is the credit firm i obtains from bank b and $\text{credit}_i = \sum_{b \in i} \text{credit}_{ib}$ is firm i 's total

Figure 4: Share of credit from the main bank by firm size



Note: The figure displays the share of outstanding nominal amount (ONA) from the main bank by debtor country and firm size. The share is computed at the firm level. The box plot's bar represents the interquartile range, the red line indicates the median credit concentration. The average of credit concentration is indicated by the red triangle. For readability, upper and lower whiskers are omitted. Countries are ordered by the descending average share of large firms. The sample period is December 2019.

Figure 5: **Average share of credit from the main bank**



Note: The figure reports the average share of credit from the main bank that a firm has. The Unconditional bar represents the unconditional average, while the Conditional one represents the average controlling for size and sector dummies as specified in Equation 4. The y-axis begins at 0.80. Country order of large firms is kept.

credit. The results, reported in Appendix Figure A1, fully confirm those based on the main bank.

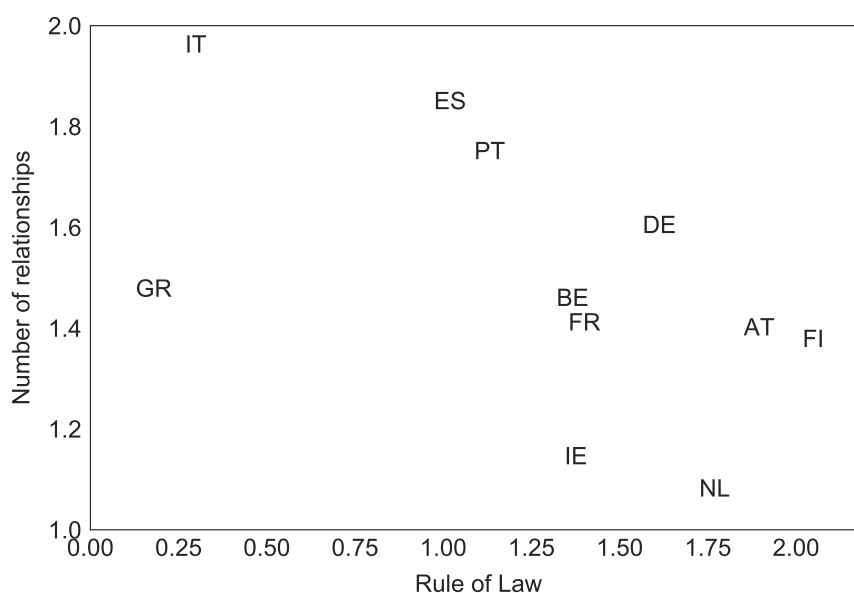
3.3 Main takeaways

Overall, the evidence presented in this section points to substantial differences in the firm-bank relationship across European countries. At one extreme, Ireland and the Netherlands are well represented by a model in which firms tend to do business mostly with one bank. At the other, Italian, Spanish, and Portuguese firms display a greater tendency to entertain multiple banking relationships and draw a lower share of credit from the main bank. The other countries are in between these two models, with Greece and, to a lesser extent, France closer to the Southern European model and Finland, Germany, Belgium, and Austria closer to the main bank model. We have shown that firm size distribution and sector specialization may explain some of these differences but other (unidentified) factors must play a more

important role.

The legal environment and the quality of contract enforcement is likely to explain some of the differences. For example Figure 6 plots the average number of banking relationships in each country and the values of a “rule of law” indicator, which measures the quality of contract enforcement and the protection of property rights. The associated correlation (-0.57) suggests that indeed in countries where the legal environment is less supportive of property rights, the number of firm-bank relationships tends to be higher. This might be because, where contracts are less enforceable, banks are able to recover less from a bankruptcy procedure. As a consequence, they prefer to diversify their portfolio of loans on a large number of firms. More analysis is needed to establish a causal effect and eventually uncover other determinant factors.

Figure 6: **Number of relationships vs Rule of Law**



Note: The figure shows the correlation (negative, -0.57) between the average number of firm-bank relationships and the rule of law estimates by country. The data for rule of law is sourced from the Governance data set (World Bank) and is presented in units of standard normal distribution (from -2.5 to 2.5).

The differences in the number and importance of firm-bank relationships could have important consequences on firms’ performance. On the one hand, higher credit concentration allows firms to develop a closer link with the main bank, which might be more willing to act like an equity holder, providing more long term finance and a more stable credit supply

also to face large, unexpected shocks (see, for example, Petersen & Rajan 1994). On the other hand, being dependent on one bank might expose the firm to liquidity and funding shocks affecting its lenders (Detragiache et al. 2000, De Jonghe, Dewachter, Mulier, Ongena & Schepens 2019). Moreover, being dependent on only one bank might reduce the bargaining power of the firm against the bank, implying higher interest rates (Rajan 1992). In what follows, we study the types of credit contracts, the loan maturity and the interest rates to gain further insights on these issues.

4 Credit contracts

In section 2.3 we have defined five broad instruments used by firms to obtain credit from banks: loans, credit lines, trade receivables, financial leases and revolving credit. In terms of maturity, we have classified the first two instruments as long term and the others as short term. Long term credit is particularly suitable to finance investments, while short term credit is typically used to finance working capital. Moreover, as shown above, the costs of borrowing short term is typically higher. It is therefore interesting to analyze to what extent European firms differ by country in terms of the instruments used to get credit from banks.

We construct the shares by instrument type at the country level as follows:

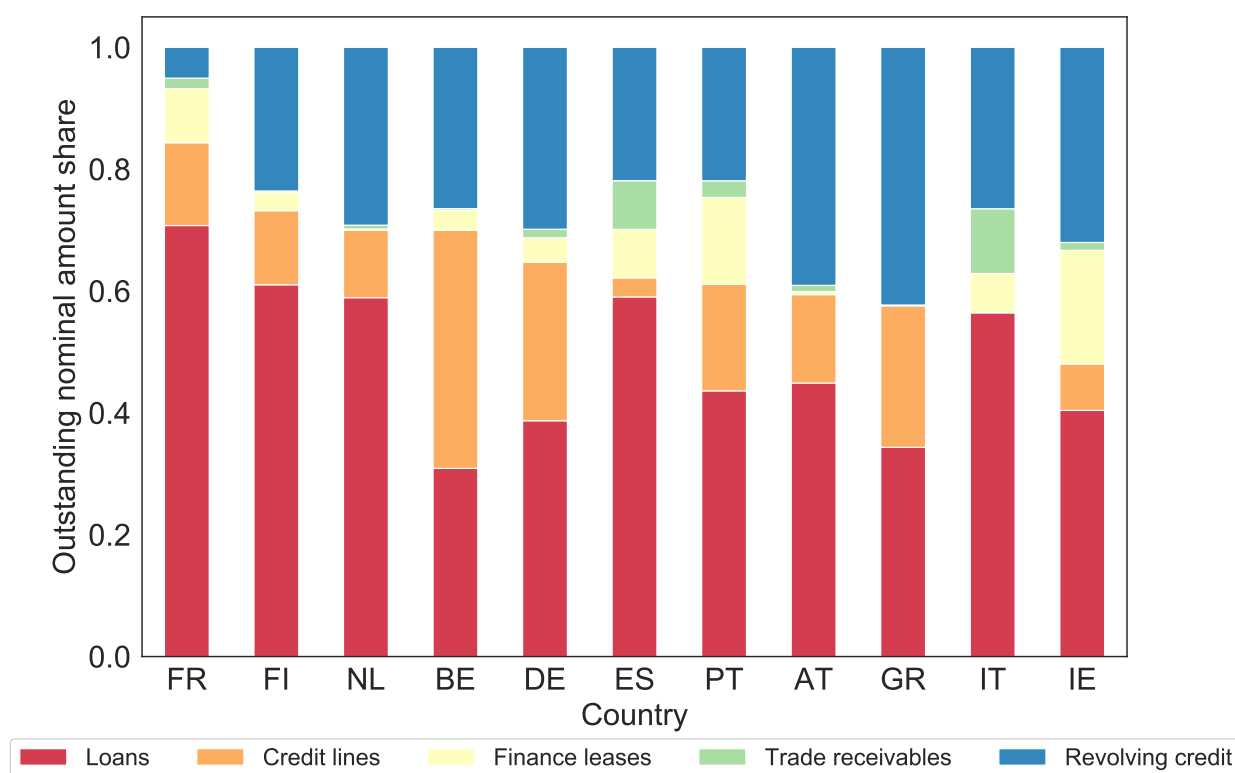
$$\text{ShInstr}_{jc} = \frac{1}{N_c} \sum_{i \in c} \left(\frac{\text{credit}_{ijc}}{\text{credit}_{ic}} \right) \quad (5)$$

where j is the type of instrument, N_c is the total number of firms in country c , credit_{ijc} is the total credit a firm has in country c and instrument type j , and credit_{ic} is firm i total credit. Figure 7 plots the share of credit by instrument for each country.¹⁹ We rank countries in terms of the share of credit obtained through loans and credit lines—that is, long term credit. The graph shows large cross country differences in the relative importance of the credit instruments. French firms show the highest reliance on long term credit (more than 80%), followed by Finnish and Dutch firms. At the other extreme, Greek, Italian and Irish firms borrow less than 60% long term.

Other interesting differences emerge. In terms of short term instruments, revolving credit is particularly used in Austria, Ireland and Greece (which records the highest share). Italy

¹⁹To better summarize the information, we only report country aggregates in the main text. Appendix Figure A4 shows the share by firm size. The country rankings by instrument type tend to be less stable across size classes compared to the other variables that we consider in the analysis.

Figure 7: Instrument type shares



Note: The figure reports the shares of total outstanding amount by loan types coming from all banks. The countries are arranged according to the combined shares of loans and credit lines in descending order.

and Spain have relatively high shares of trade receivables, possibly reflecting longer payments terms used in business to business transactions. Credit lines are important in Belgium and Greece, where they account for a share of credit similar to that of loans, as well as in Germany. These instruments are not used in Italy, and not much used in Spain. Leases are more common in France, Ireland and Portugal, while they are used very marginally in Austria, Germany, Greece and the Netherlands.

If firms have several banking relationships, it is possible that they borrow on long term instruments mainly from the main bank, while rely on other instruments when dealing with fringe banks. In fact, long term financing might require a deeper understanding of firm projects and growth prospects, which is more likely to be developed by the main bank. Moreover, the main bank's willingness to provide financing may be affected by the knowledge that the firm is acquiring funds also from other banks (Degryse, Ioannidou & von

Schedvin 2016). To analyze this possibility, Appendix Figure A3 plots the instrument type shares separately for all banks except the main bank (first bar) and for the main bank only (second bar). The figure supports this conjecture: in all countries except Belgium, the main bank supplies a larger fraction of credit through long term instruments. This suggests that “fringe” banks act mostly as liquidity providers, in line with the hypothesis that firms entertain multiple banking relationships to insure themselves against banks’ liquidity shocks (see Detragiache et al. (2000)). Of course there may be other sources behind these pronounced differences in the use of borrowing contracts. For example, Degryse, De Jonghe & Karagiannis (2021)) show that as a result of a legal change supporting credit to small firms, banks in Belgium generally reduced the supply of term loans while increasing revolving credit lines.

Overall, these results indicate that countries differ substantially in terms of the instrument used to obtain credit. Compared to the three clusters of the previous section, here too we find evidence of a North-South divide, more marked for Italy and Greece, while Spain and Portugal are closer to the mean values.

5 Maturity

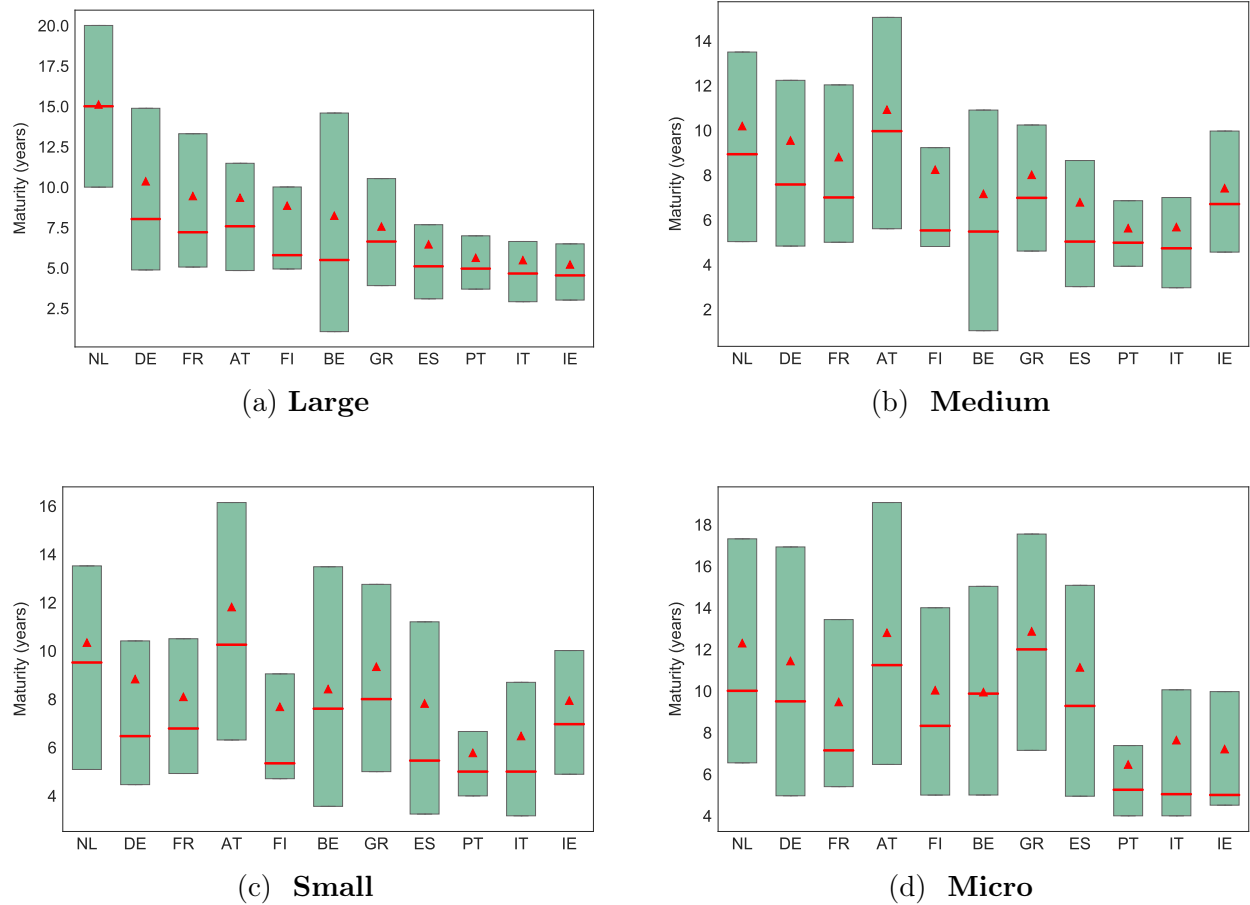
In the previous section we have analyzed the reliance on different types of credit contracts, and found that there are substantial cross country differences in how much firms borrow on long term credit, that is, loans and credit lines. This can be seen as the extensive margin of credit maturity. In this section we further deepen this aspect and analyze the maturity of the two long term instruments. We focus on loans and credit lines because for the short term instruments maturity is less meaningful: for example, revolving credit has no maturity, as the firm can draw on the facility as long as the bank keeps it open. To simplify the analysis, we consider total long term credit and construct its average maturity at the firm level as follows:

$$m_{ic} = \sum_b \sum_{j=L,CL} \bar{w}_{ijbc} m_{ijbc} \quad (6)$$

where we only sum over loan (L) and credit lines (CL), $\bar{w}_{ijbc} = \frac{ONA_{ijbc}}{\overline{ONA}_{ic}}$ and $\overline{ONA}_{ic} = \sum_b \sum_{j=L,CL} ONA_{ijc}$ and the bar indicates that we are summing over loans and credit lines only.

Figure 8 reports the results by firm size, ordering countries in descending order of maturity

Figure 8: Maturity by firm size



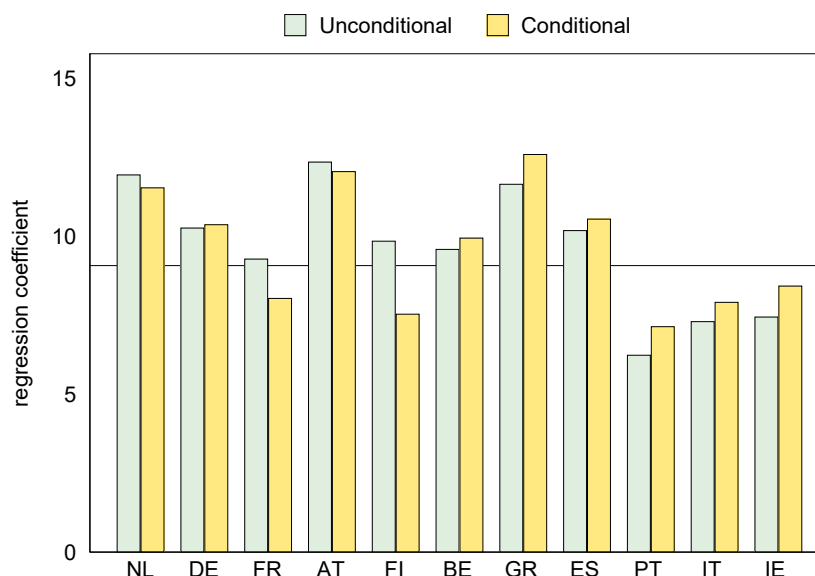
Note: The figure shows the distribution of (weighted by outstanding amount) maturities (in years) by debtor country and firm size. The values are computed at the firm level. The box plot's bar represents the interquartile range, the red line indicates the median maturity. The average of the maturity is indicated by the red triangle. For readability, upper and lower whiskers are omitted. The order of countries is by the descending average value of large firms. The sample period is December 2019. The credit contracts include only long-term maturity instruments, i.e. loans and credit lines.

for large firms. Maturity has a large degree of cross country variability. Dutch firms have an exceptionally high average maturity of 15 years for bank credit. German firms, which rank second, have an average maturity of 10 years. Next, we have France (9.5), Austria (9.4), Finland (8.9), Belgium (8.2) and Greece (7.6). Spain, Portugal, Italy and Ireland display a maturity between 7 and 5 years. Interestingly, this ranking also indicates a cluster of Northern countries with longer maturities and one of Southern countries with shorter maturity. For example, the average maturity of long term bank debt of Italian firms is 47.0% lower than that of German firms. This pattern resembles to a large extent what we have seen for the number of relationships and the type of instruments. The Netherlands and Ireland represent a special case, as they display very similar values in terms of number of relationships and of share of credit from the main bank, but are at the opposite extremes in terms of maturity. Together with the evidence on the extensive margin of credit maturity, where Irish firms display the lowest share of borrowing long term while the Dutch firms are in the middle of the distribution (see Figure 7), this suggests that the single bank model may generate very different outcomes in these two countries.

In terms of other size classes, first we notice that average maturity seems to be fairly similar across size—if anything, large firms tend to have a shorter maturity. This might be due to the fact that they tend to finance long term projects more with the issuance of bonds compared to smaller firms. The country ranking is broadly confirmed across size classes. The most noticeable exception is Austria, which ranks at the top of maturity for all size classes but the large one, and, to a smaller extent, Greece and Ireland, where the same pattern emerges.

Figure 9 plots the country averages, both unconditional (left bar) and conditional on size and sector (right bar). The average unconditional maturity ranges from around 12 years for Austria, the Netherlands and Greece to 6 for Portugal, broadly confirming the cross country variation. The increase in the ranking of Greece is due to the fact that small and especially micro firms in Greece tend to borrow at longer maturities than large firms (see Figure 8c and 8d). As for the number of relationships and share of credit from the main bank, the differences between the unconditional and the conditional mean are fairly small, confirming that there is an important country component in the determination of the firm-bank relationship.

Figure 9: **Average Maturity**



Note: The figure reports the regression estimates of the country effect on the weighted average maturity (in years). The Unconditional bar represents the unconditional average, while the Conditional one represents the average controlling for size and sector dummies as specified in Equation 8. Country order of large firms is kept.

6 Interest rates

In Section 2.4 we have constructed the measure of interest rate at the firm level as the weighted average of the interest rate on each contract, weighted by the share of the outstanding amount the contract accounts for (see Equation 3). We now analyze how this measure differs across countries. As for the other variables, we use simple means, that is,

$$r_c = \frac{1}{N_c} \sum_{i \in c} r_{ic}. \quad (7)$$

We then perform a shift and share decomposition to assess how much of the observed heterogeneity is due to differences in the firms' size and sector structure, in the reliance on different instruments or in country-specific effects unexplained by firm and contract characteristics.

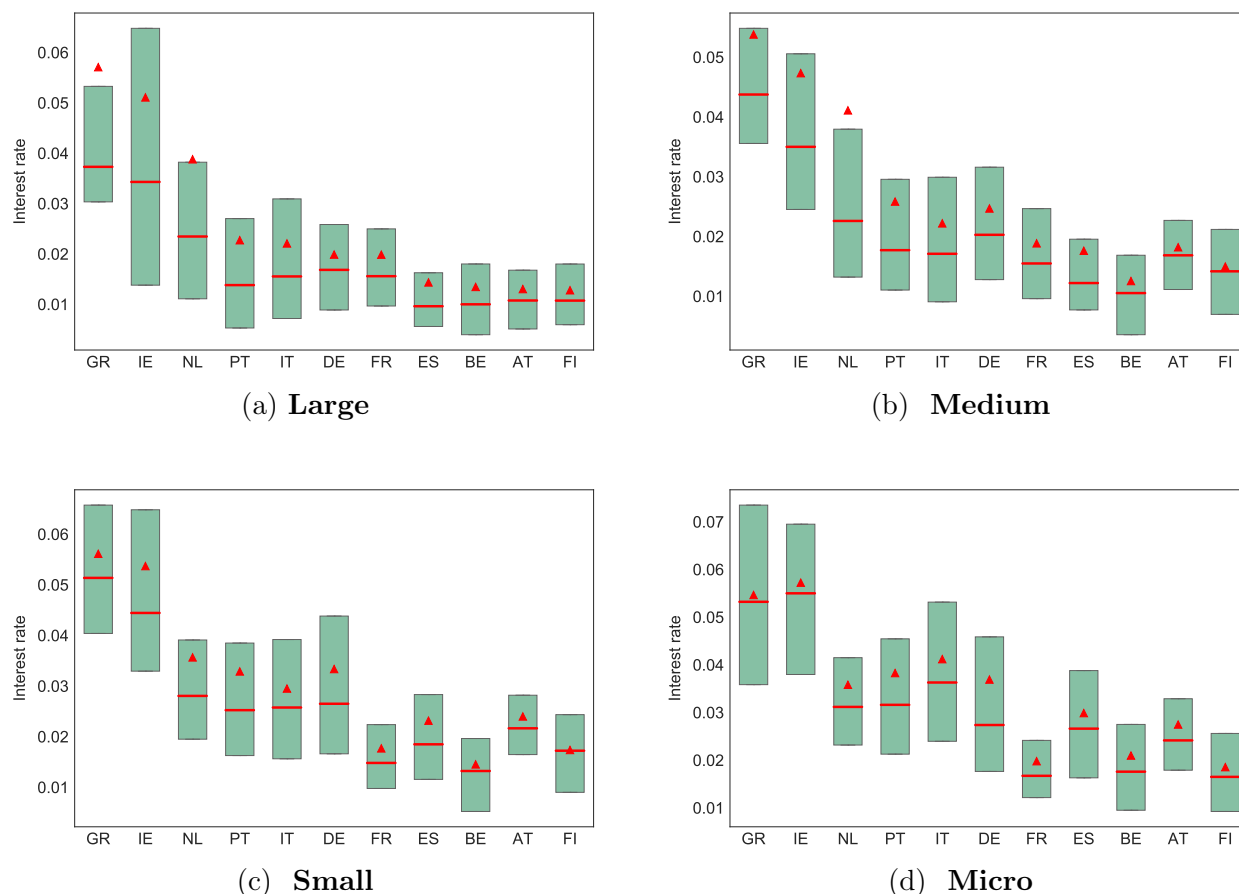
6.1 Cross country differences in interest rates

Figure 10 shows the interest rate by country and firm size, ranking countries in terms of average interest rate paid by large firms. Greek firms are at the top of the distribution, with an average rate of almost 6%. Note that the mean is above the 75th percentile, suggesting a long tail of firms paying high interest rates. In fact, the median is below 4%, but even in this case it represents the highest value among the 11 countries. Next, Irish firms pay an average rate of 5%, and Dutch firms of 4%. Ireland is also the country with the largest interquartile range: the 75th percentile of the distribution is 6.5% and the 25th is 1.4%. The other countries record lower and similar average rates, with Portugal, Italy, Germany and France just above 2% and Spain, Belgium, Austria and Finland just below 2%. This pattern is basically identical for medium size firms, and very similar for small and micro firms. Two differences emerge for the smaller size classes: Dutch firms pay rates more similar to the middle group of countries and French firms are closer to the countries that pay the lowest rates. In all cases, the difference between the highest rate and the lowest is between 3% and 4%, a very large figure compared to a cross country mean of 3%. The differences in interest rates may be linked also to the number of firm-bank relationships that we have analyzed in the previous sections. Recent evidence has shown that banks with close ties with firms exploit their informational advantage and charge higher interest rates than those that would prevail were all banks symmetrically informed. However, these differences do not generally persist (Schenone 2009, Ioannidou & Ongena 2010)).

We have seen in Figure 1 that interest rates are more dispersed across instrument types than size classes. In Appendix Figure A2 we report the interest rates by country and instrument. To a large extent, the same country pattern of Figure 10 emerges within instruments, with Ireland and Greece showing higher rates. Moreover, in Figure 7 we have seen that firms in different countries rely to a different extent on different instruments. In particular, Ireland and Greece, that record the highest average rate, are also the countries where firms borrow the most through revolving credit, which is also the most expensive form of credit, as shown in Figure 1b. We will come back to this point in the decomposition exercise that we perform in the next subsection.

Figure 11 reports the cross country average interest rate. The results confirm those of Figure 10. In fact, there are substantial differences in the average interest rate across countries. At one extreme, Greece and Ireland have an average interest rate of almost 6%.

Figure 10: Interest rates by firm size

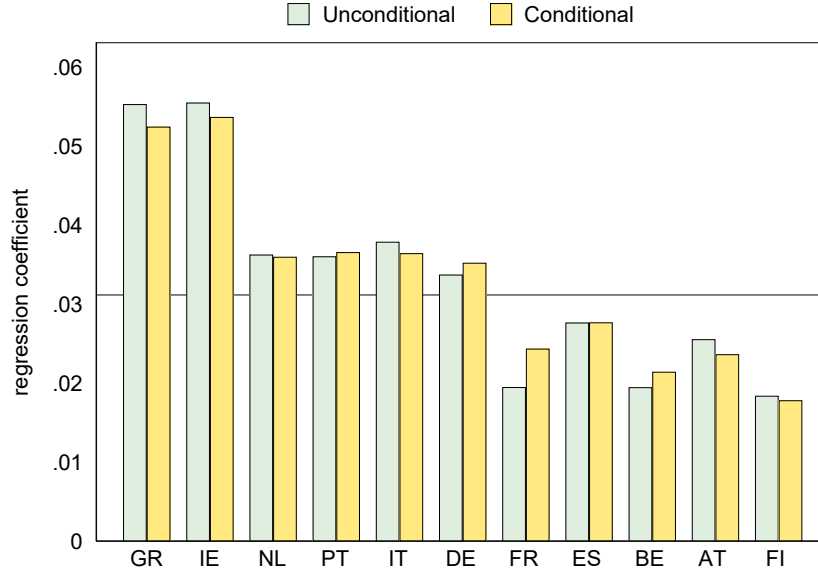


Note: The figure shows the distribution of interest rates by debtor country and firm size. The interest rates are computed at the firm level. The box plot's bar represents the interquartile range, the red line indicates the median interest rate. The average of the interest rate is indicated by the red triangle. For readability, upper and lower whiskers are omitted. The countries are ordered by the descending average values of large firms. The sample period is December 2019.

At the other, Belgium, France and Finland have an interest which is around a third of such value (2%). The other countries are somewhere in the middle, with the interest rate ranging between 3% and 4%. The standard deviation of r_c is 1.2%, about a third of the mean value.

Cross country differences in the interest rates may reflect differences in the underlying firm characteristics and/or in the types of borrowing contracts. If similar firms in different countries pay different rates on the same credit contract, one would need to resort to a “country effect” to explain rates, such as the competitiveness of the banking sector or differences in the overall cost of funding for banks, that are passed over to borrowers. If instead differences are mostly due to firm characteristics and instrument types, similar firms borrowing on the

Figure 11: **Average Interest Rate**



Note: The figure reports the regression estimates of the country effect on the weighted average interest rate. The Unconditional bar represents the unconditional average as defined in Equation 7, while the Conditional one represents the average controlling for size, sector and instrument type dummies as specified in Equation 8. Country order of large firms is kept.

same instrument would be paying similar rates, indicating a higher degree of homogeneity in credit conditions than that suggested by the unconditional means. The previous analysis indicates that the differences also emerge within size class and instrument type. However, considering one aspect at a time might not be able to fully account for firm and contract characteristics. As we did for the number of banking relationships, we run the following regression:²⁰

$$r_{isgjc} = \sum_{c=1}^{11} \alpha_c^r D_c^{\text{Ctry}} + \sum_{g=1}^4 \beta_g^r D_g^{\text{Size}} + \sum_{s=1}^{20} \gamma_s^r D_s^{\text{Sect}} + \sum_{j=1}^5 \theta_j^r D_j^{\text{Instr}} + \eta_{isgjc} \quad (8)$$

where r_{isgjc} is the interest rate for instrument type j of firm i in size class g , sector s and country c , D_j^{Instr} are dummies for the five instruments, D_g^{Size} are size dummies that are equal to 1 if firm i belongs to size class g , D_s^{Sect} are two-digit sector dummies, D_c^{Ctry} are country dummies and η_{isgjc} is the residual. The constant is omitted to include all levels of D_c^{Ctry} , which represents the conditional average interest rates, and we use the same normalization

²⁰Note that, compared to Equation 4 where the unit of observation is a firm-period, here we are at the more granular level of firm-instrument-period.

as we have done for the number of firm-bank relationships to obtain an overall mean equal to the unconditional one. To make the estimates comparable to the unconditional averages, we weight each observation by ω_{ijc} as defined in Equation 2.²¹

The right bars of Figure 11 plot the estimated country dummies $\hat{\theta}_c$, which represents the conditional mean. There is some evidence of convergence, as countries with value above the horizontal bar, that represents the overall mean, are more likely to register a drop in rates and vice versa. But there are also a few cases in which the opposite occurs, or in which the two values are almost identical. The standard deviation of the average interest rate drops somehow, from 1.3% to 1.2%, but remains substantial. This indicates that, while firm characteristics partially account for cross country differences in interest rates, most of the heterogeneity remains unexplained. It is important to underline how these differences persist across countries that have been in a monetary union for more than two decades. At the same time, the presence of these differences affects the transmission of monetary policy and the provision of banks' credit supply to firms (Bittner, Bonfim, Heider, Saidi, Schepens & Soares 2022)

6.2 Shift and share decomposition

We want to determine how much of the cross country difference in average rates is due to differences in the distribution of firm characteristics and instrument type across countries and how much is due to differences within firm type and instrument type average rates. Our unit of analysis is a sector s , firm size g and instrument type j . For size and sector, the exercise is straightforward. Consider the case of firm size. For class size $g = 1, \dots, 4$, define the average interest rate $r_{gc} = \frac{1}{N_{gc}} \sum_{i \in g} r_{ic}$, where N_{gc} is the number of firms in size class g and we sum over all firms in that size class. Define the share of firms in class g as $\omega_{gc} = \frac{N_{gc}}{N_c}$. By construction, $r_c = \sum_g \omega_{gc} r_{gc}$, where $r_c = \frac{1}{N_c} \sum_i r_{ic}$. Define barred variables as those constructed using firms in all countries, that is, at the European level. We can now decompose the difference in the mean rate for a country c with respect to the European level using the Baily, Hulten & Campbell (1992) decomposition:

$$r_c - \bar{r} = \sum_{g=1}^4 \left\{ \underbrace{(\omega_{gc} - \bar{\omega}_g) \bar{r}_g}_{\text{Between}} + \underbrace{(r_{gc} - \bar{r}_g) \bar{\omega}_g}_{\text{Within}} + \underbrace{(\omega_{gc} - \bar{\omega}_g)(r_{gc} - \bar{r}_g)}_{\text{Cross}} \right\} \quad (9)$$

²¹In fact, if we run the regression with only country dummies, we recover exactly the unconditional mean rates.

The Between term captures the deviation in the country interest rate relative to the European average due to differences in firm size structure. For example, a country with a higher share of small and micro firms, paying a slightly higher interest rate (see Figure 1a), will register a positive Between component. The Within term captures differences within size class, fixing the size composition at the overall sample average. When this component is large relative to the Between one, it means that the average rate is (say) higher because firms pay a higher rate controlling for the size difference. The cross term is a covariance, and it is positive when a country has a larger share of firms compared to the overall average in the size classes with higher rate, again relative to the overall average. The method applies identically for sectors.

Things are more complicated for instrument types, as they enter the definition of firm level interest rate weighted by the share of ONA each instrument accounts for within firm. In this case, we define the average interest rate for instrument j as:

$$r_{jc} = \sum_i \frac{\omega_{ijc}}{\sum_i \omega_{ijc}} r_{ijc} \quad (10)$$

where, as defined in Section 2.4, $\omega_{ijc} = \frac{ONA_{ijc}}{ONA_{ic}}$, $ONA_{ic} = \sum_j ONA_{ijc}$. That is, we weight each interest rate by its contribution to the firm-level interest rate and normalize the weights so that they sum to one. The overall weight of instrument j is defined as:

$$\omega_{jc} = \frac{1}{N_c} \sum_i \omega_{ijc}. \quad (11)$$

It is immediate to show that, with this definition, the average cross-instruments interest rates coincides with r_c .

Table 2 reports the results of the decomposition. At the high end, in Ireland and Greece the average rate is 2.7% higher than the cross country average of 2.8%. At the other end, in Belgium and Finland the average rate is almost 1% lower than the cross country average. The size decomposition confirms that the differences in the size structure are a minor determinant of cross country differences in the interest rate. In fact, the Within component explains basically all the differences for all countries. The largest Between component is the German one: due to the higher share of large firms, the average rate in Germany is 10 basis point lower than it would be if it had the same size structure as the cross-country one. This negative component is more than compensated by the higher rates that German firms pay within size class. The Cross component is generally small. This result is partially explained by the fact that the differences in the interest rates across size classes are not very large (see Figure 1a)

Table 2: Shift and share decomposition by size class, sector and instrument

Country	Rate	Difference	By Size			By Sector			By Instrument		
			Between	Within	Cross	Between	Within	Cross	Between	Within	Cross
IE	5.52	2.71	-0.05	2.77	-0.01	0.12	2.35	0.24	0.46	2.19	0.06
GR	5.50	2.69	-0.02	2.68	0.02	0.19	2.37	0.13	0.50	1.90	0.29
IT	3.77	0.96	0.01	0.92	0.02	0.11	0.88	-0.03	0.33	0.45	0.17
NL	3.61	0.79	0.00	0.80	-0.01	0.06	0.65	0.09	0.20	0.52	0.08
PT	3.59	0.77	-0.02	0.81	-0.02	0.10	0.70	-0.03	0.13	0.72	-0.08
DE	3.36	0.54	-0.10	0.71	-0.07	0.08	0.50	-0.03	0.17	0.22	0.15
ES	2.75	-0.06	0.00	-0.06	-0.00	0.09	-0.12	-0.03	0.16	-0.13	-0.09
AT	2.54	-0.27	-0.04	-0.21	-0.02	0.05	-0.29	-0.02	0.46	-0.41	-0.32
FR	1.94	-0.87	0.03	-0.88	-0.01	-0.17	-0.91	0.20	-0.42	-0.67	0.22
BE	1.94	-0.87	0.02	-0.91	0.01	0.11	-0.88	-0.10	-0.19	-1.09	0.40
FI	1.83	-0.98	0.06	-1.01	-0.03	-0.11	-0.80	-0.07	0.08	-0.93	-0.14

Note: The table reports the shift and share decomposition by size class, sector and instrument. Rate is the average interest rate, Difference is the difference of the country interest rate with respect to the total sample average. This difference is decomposed in the Between, Within and Cross components based on Equation (9) by size class, sector and instrument type.

Some more action from the Between component emerges when decomposing in terms of sectoral specialization. In this case, for most countries this component accounts for around 10 basis points (in absolute value) of the total difference. However, even in this case the Within component is much more important. The Cross component is also relevant for some countries. For example, it accounts for 20 basis points higher average rate for France, implying that, compared to the overall sample, France tends to have a larger share of firms in sectors in which firms pay higher rates and vice-versa.

The Between component plays a more important role when we decompose in terms of the type of instrument. Greece, Ireland, Austria and Italy record an average rate that is between 30 and 50 basis points higher than in the case of having the same share of credit by instrument type as the overall average. The Netherlands, Portugal, Spain, Germany and Belgium also show a positive contribution from this component, while France and Belgium are the only countries that show a negative contribution. The within component still plays a prominent role, but to a lesser extent than in the case of size structure and sector specialization. The cross term is also somehow important, but less than the other two.

Overall, the decomposition exercise indicates that size structure and sector specialization play a relatively minor role in explaining the cross country differences in the average rates. Instead, differences in the reliance on credit instruments play a more prominent role. This is consistent with the substantial differences recorded in the interest rates across instruments, as shown in Figure 1b. However, most of the variation in the average interest rate across countries is not accounted for by these factors, pointing to unexplained country effects.

7 Conclusions

Firm-bank relationships in euro area countries differ significantly across firm size and countries. In some countries, the traditional model of relationship banking in which one main bank is providing the large part of corporate financing is prevalent while in other countries multiple lending relationships are the norm. The instruments used to provide financing to euro area firms are also different in maturities and other important characteristics, such as the revolving feature. These important differences also translate in significant divergences in the interest rates that are charged to corporate borrowers.

We provide a picture of corporate financing through banks in the euro area, highlighting the important structural differences that remain in the area, notwithstanding the ongoing process of financial integration in the euro area/EU and, of course, a monetary union that has been implemented more than 20 years ago. This analysis is of particular value for policy makers taking decisions on macroeconomic and regulatory policies affecting the bank-firm relationships. It is clear that the transmission and the impact induced by these policies - monetary policy, but also supervisory and regulatory policies as well as industrial policy - depend crucially on the differences that we unveil and that should be duly taken into account in the evaluation of these policies.

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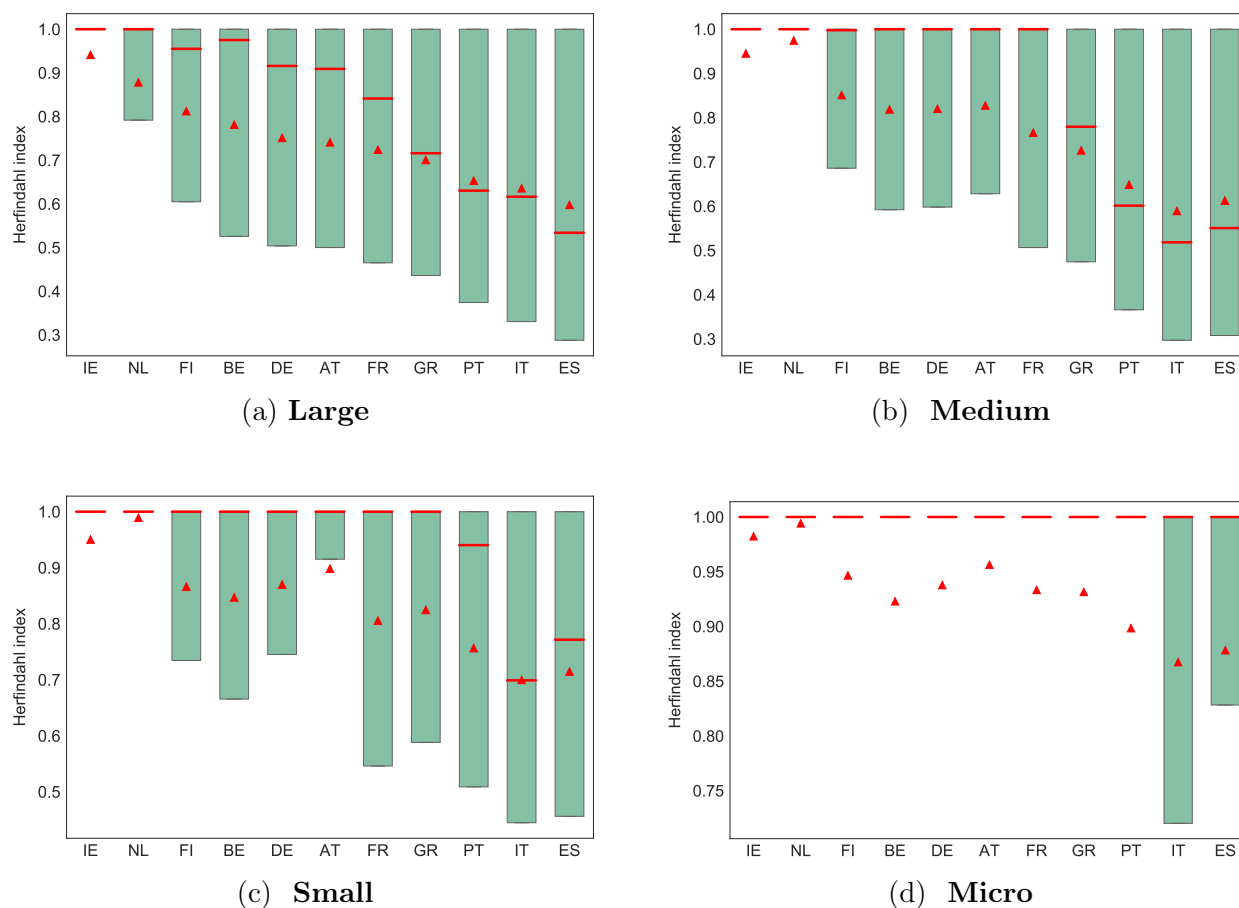
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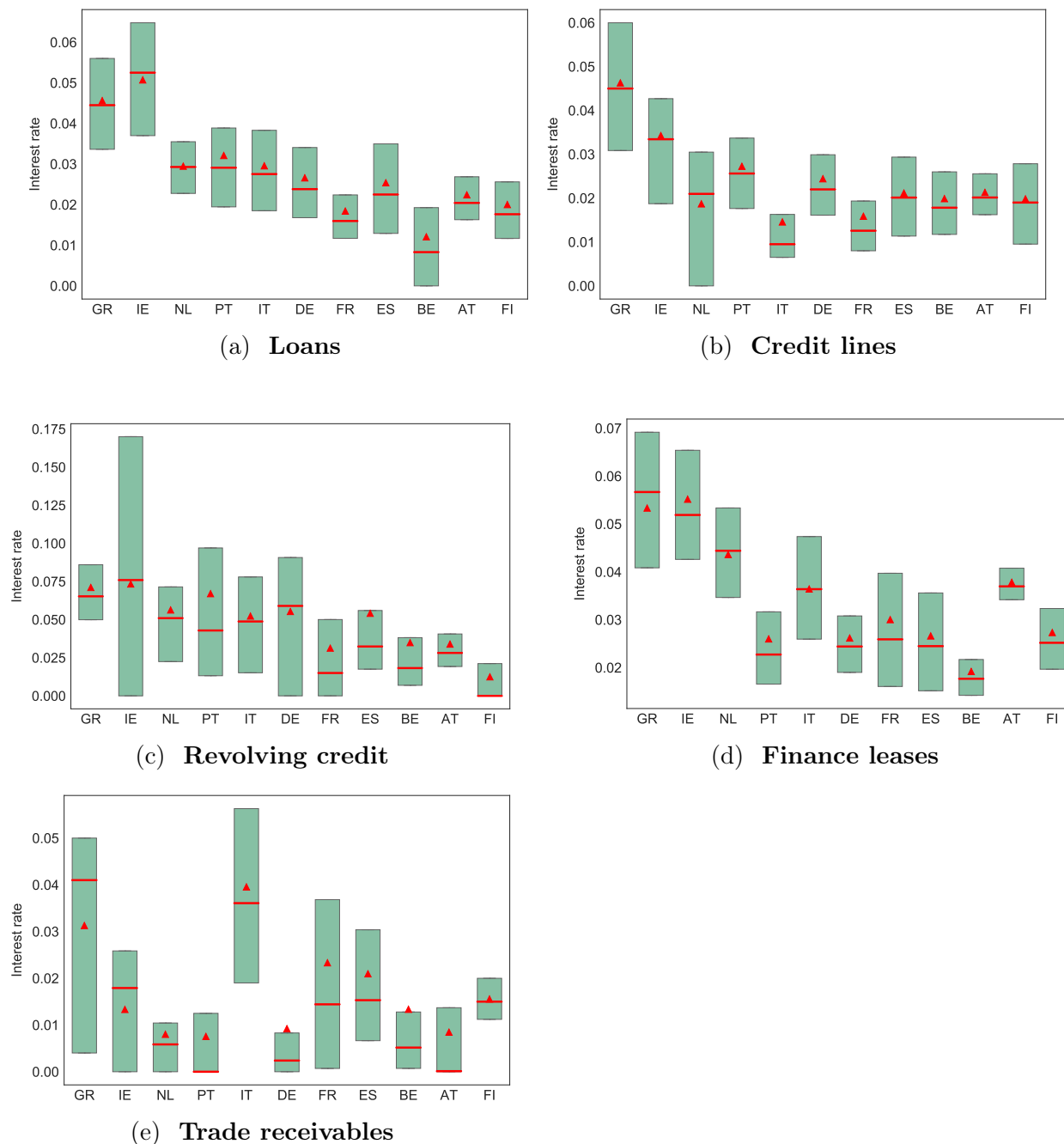
A Additional Tables and Figures

Figure A1: Credit concentration - Herfindahl index



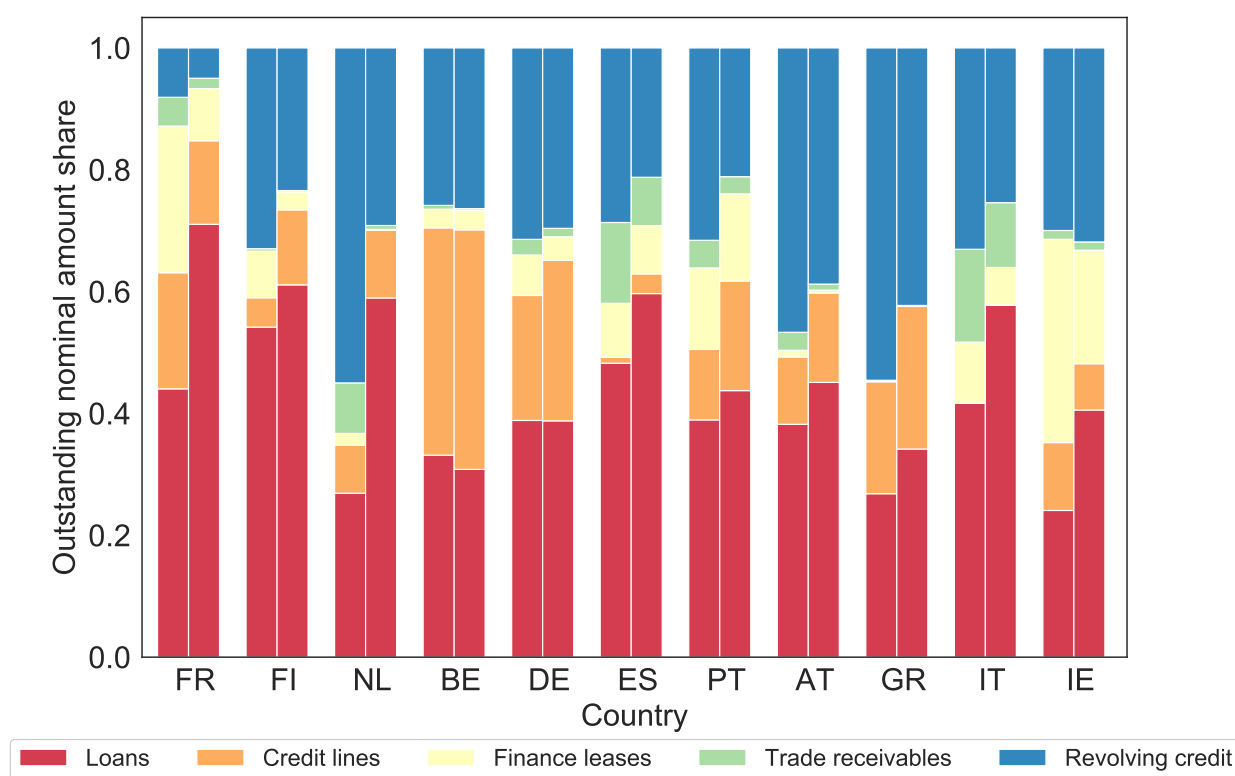
Note: The figure shows the Herfindahl-Hirschman index by debtor country and firm size. The index is computed at the firm level. The box plot's bar represents the interquartile range, the red line indicates the median credit concentration. The average of credit concentration is indicated by the red triangle. For readability, upper and lower whiskers are omitted. Countries are ordered by descending average credit concentration of large firms. The sample period is December 2019.

Figure A2: Interest rates by instrument type



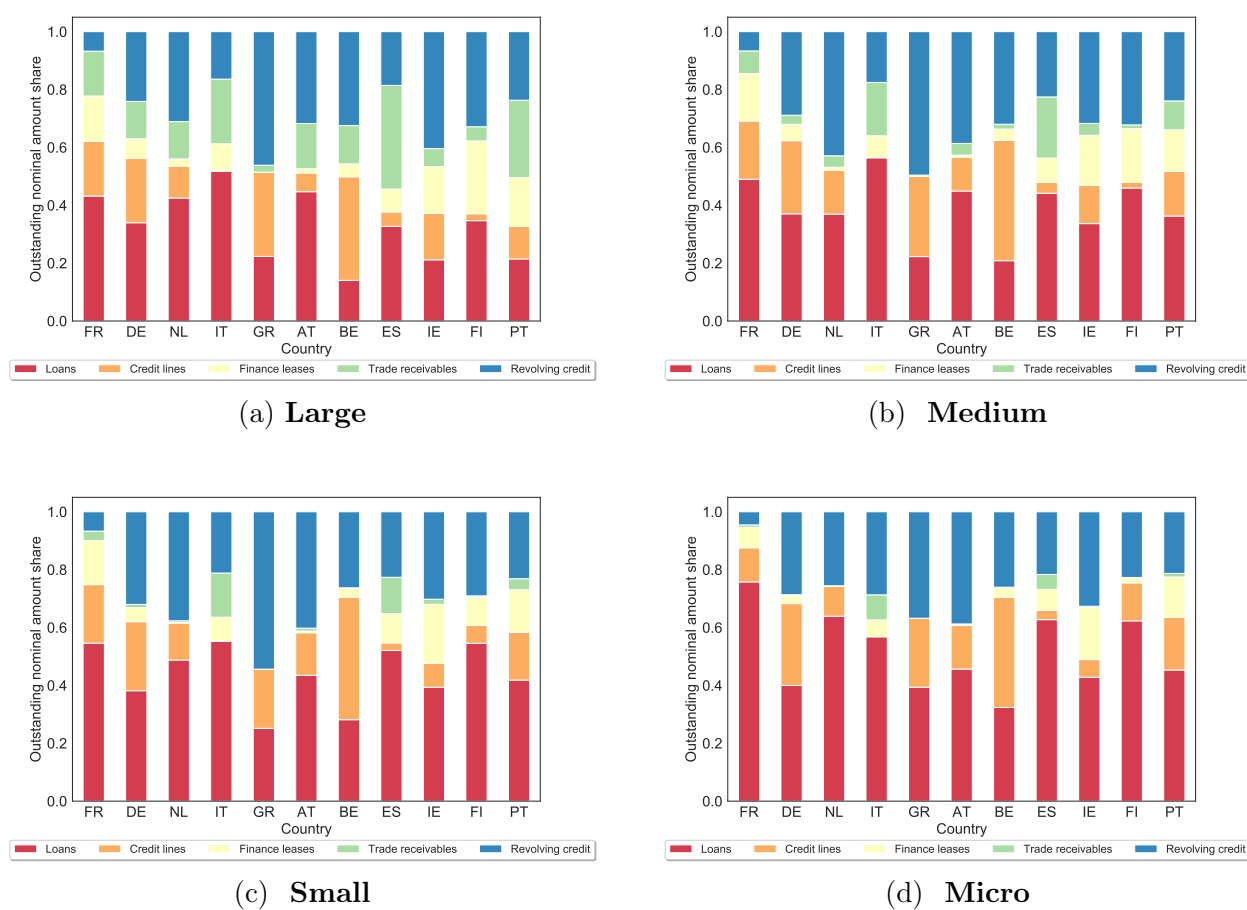
Note: The figure shows the interest rates on instrument type level. The box plot's bar represents the interquartile range, the red line indicates the median interest rate. The average of the interest rate is indicated by the red triangle. For readability, upper and lower whiskers are omitted. The country order of large firms is kept. The sample period is December 2019.

Figure A3: Instrument type shares for the main banks and all other banks



Note: The figure reports the shares of total outstanding amount by loan types coming from all banks except the main bank (first bar) and coming from the main bank only (second bar). The countries are arranged according to the combined shares of loans and credit lines from all banks in descending order.

Figure A4: Instrument type shares by firm size



Note: The figure reports the shares of total outstanding amount by loan types coming from all banks by firm size. The countries are arranged according to the combined shares of loans and credit lines in descending order for large firms.

Table A1: Summary statistics by size: Austria

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	1,335	467	6,400	26,129	32,684
Number of banks	1,335	1	2	4	3
Share from main bank	1,335	0.59	0.95	1.00	0.80
Herfindahl index	1,335	0.50	0.91	1.00	0.74
Interest rate (%)	1,269	0.51	1.08	1.68	1.30
Maturity (in years)	837	4.85	7.59	11.50	9.36
Number of employees	1,333	89	292	512	595
Balance sheet total (in thousands)	1,331	48,015	77,156	180,264	297,538
Annual turnover (in thousands)	1,302	46,210	89,707	187,986	225,048
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	4,585	326	1,766	5,788	7,199
Number of banks	4,585	1	2	3	2
Share from main bank	4,585	0.76	1.00	1.00	0.87
Herfindahl index	4,585	0.63	1.00	1.00	0.83
Interest rate (%)	4,493	1.11	1.68	2.27	1.82
Maturity (in years)	3,240	5.61	9.97	15.05	10.93
Number of employees	4,546	20	62	100	70
Balance sheet total (in thousands)	4,569	5,172	11,967	21,073	33,542
Annual turnover (in thousands)	4,453	5,039	11,885	23,268	18,849
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	20,206	115	418	1,331	1,402
Number of banks	20,206	1	1	2	1
Share from main bank	20,206	0.96	1.00	1.00	0.92
Herfindahl index	20,206	0.92	1.00	1.00	0.90
Interest rate (%)	20,131	1.65	2.17	2.82	2.40
Maturity (in years)	14,753	6.31	10.26	16.15	11.82
Number of employees	19,970	10	15	23	17
Balance sheet total (in thousands)	19,756	891	2,107	3,978	5,092
Annual turnover (in thousands)	19,594	1,009	2,095	3,932	3,244
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	37,847	49	152	446	505
Number of banks	37,847	1	1	1	1
Share from main bank	37,847	1.00	1.00	1.00	0.97
Herfindahl index	37,847	1.00	1.00	1.00	0.96
Interest rate (%)	37,817	1.79	2.42	3.29	2.75
Maturity (in years)	26,899	6.47	11.25	19.07	12.80
Number of employees	36,821	1	2	4	3
Balance sheet total (in thousands)	33,785	206	497	1,113	1,465
Annual turnover (in thousands)	35,275	105	305	693	542

Table A2: Summary statistics by size: Belgium

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	1,371	398	3,295	15,046	19,584
Number of banks	1,371	1	2	3	2
Share from main bank	1,371	0.65	0.99	1.00	0.83
Herfindahl index	1,371	0.53	0.98	1.00	0.78
Interest rate (%)	1,158	0.40	1.00	1.80	1.35
Maturity (in years)	877	1.06	5.50	14.61	8.25
Number of employees	1,168	129	321	624	921
Balance sheet total (in thousands)	1,361	47,125	76,596	186,455	597,147
Annual turnover (in thousands)	1,214	51,051	103,521	236,495	453,048
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	6,009	359	1,534	4,475	3,753
Number of banks	6,009	1	2	2	2
Share from main bank	6,009	0.72	1.00	1.00	0.86
Herfindahl index	6,009	0.59	1.00	1.00	0.82
Interest rate (%)	5,433	0.36	1.05	1.69	1.25
Maturity (in years)	4,738	1.05	5.49	10.91	7.17
Number of employees	4,653	22	54	85	62
Balance sheet total (in thousands)	6,000	10,400	14,110	22,103	23,517
Annual turnover (in thousands)	3,730	10,795	18,774	33,091	26,430
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	29,860	153	493	1,166	970
Number of banks	29,860	1	1	2	2
Share from main bank	29,860	0.79	1.00	1.00	0.89
Herfindahl index	29,860	0.67	1.00	1.00	0.85
Interest rate (%)	27,998	0.52	1.32	1.96	1.45
Maturity (in years)	25,565	3.56	7.60	13.48	8.42
Number of employees	21,157	8	13	21	15
Balance sheet total (in thousands)	29,835	2,010	2,799	4,461	4,182
Annual turnover (in thousands)	4,413	2,219	4,957	10,539	7,795
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	126,171	35	102	250	205
Number of banks	126,171	1	1	2	1
Share from main bank	126,171	1.00	1.00	1.00	0.94
Herfindahl index	126,171	1.00	1.00	1.00	0.92
Interest rate (%)	114,164	0.95	1.76	2.75	2.10
Maturity (in years)	101,606	5.00	9.87	15.04	9.94
Number of employees	48,011	1	2	4	3
Balance sheet total (in thousands)	126,156	195	401	764	636
Annual turnover (in thousands)	5,271	254	492	974	821

Table A3: Summary statistics by size: Finland

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	764	97	1,218	12,384	20,579
Number of banks	764	1	2	3	2
Share from main bank	764	0.74	0.98	1.00	0.86
Herfindahl index	764	0.61	0.95	1.00	0.81
Interest rate (%)	760	0.60	1.08	1.80	1.28
Maturity (in years)	347	4.94	5.84	10.02	8.87
Number of employees	698	90	302	569	556
Balance sheet total (in thousands)	690	50,312	96,082	254,999	473,129
Annual turnover (in thousands)	699	54,974	103,682	248,232	300,430
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	2,182	37	558	3,800	5,689
Number of banks	2,182	1	2	3	2
Share from main bank	2,182	0.81	1.00	1.00	0.89
Herfindahl index	2,182	0.69	1.00	1.00	0.85
Interest rate (%)	2,173	0.70	1.42	2.12	1.50
Maturity (in years)	1,269	4.81	5.53	9.25	8.25
Number of employees	2,158	28	60	94	68
Balance sheet total (in thousands)	2,149	6,069	12,237	21,926	37,816
Annual turnover (in thousands)	2,139	6,503	14,055	26,064	19,753
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	9,924	20	144	643	1,247
Number of banks	9,924	1	2	2	2
Share from main bank	9,924	0.84	1.00	1.00	0.90
Herfindahl index	9,924	0.73	1.00	1.00	0.87
Interest rate (%)	9,919	0.90	1.72	2.44	1.74
Maturity (in years)	6,968	4.71	5.35	9.05	7.69
Number of employees	9,883	10	13	21	15
Balance sheet total (in thousands)	9,827	796	2,032	3,780	14,970
Annual turnover (in thousands)	9,809	1,120	2,345	4,608	3,630
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	93,111	9	35	111	256
Number of banks	93,111	1	1	1	1
Share from main bank	93,111	1.00	1.00	1.00	0.96
Herfindahl index	93,111	1.00	1.00	1.00	0.95
Interest rate (%)	93,108	0.92	1.65	2.56	1.85
Maturity (in years)	72,002	5.00	8.33	14.01	10.04
Number of employees	82,938	0	1	2	1
Balance sheet total (in thousands)	70,308	24	118	366	620
Annual turnover (in thousands)	82,308	39	115	310	291

Table A4: Summary statistics by size: France

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	11,889	121	506	2,995	8,004
Number of banks	11,889	1	2	4	3
Share from main bank	11,889	0.55	0.91	1.00	0.78
Herfindahl index	11,889	0.47	0.84	1.00	0.72
Interest rate (%)	10,536	0.97	1.56	2.50	1.99
Maturity (in years)	8,053	5.13	7.26	13.36	9.48
Number of employees	7,966	284	421	922	9,752
Balance sheet total (in thousands)	7,142	101	14,286	190,306	506,014
Annual turnover (in thousands)	9,853	71	581	54,337	29,414,539
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	35,773	120	388	1,337	2,008
Number of banks	35,773	1	2	3	2
Share from main bank	35,773	0.61	1.00	1.00	0.81
Herfindahl index	35,773	0.51	1.00	1.00	0.77
Interest rate (%)	32,373	0.96	1.55	2.47	1.89
Maturity (in years)	27,642	5.00	7.01	12.04	8.84
Number of employees	27,653	60	84	126	99
Balance sheet total (in thousands)	19,762	7	32	3,906	11,233
Annual turnover (in thousands)	28,554	8	22	391	219,713
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	147,780	78	206	570	720
Number of banks	147,780	1	1	2	2
Share from main bank	147,780	0.67	1.00	1.00	0.85
Herfindahl index	147,780	0.55	1.00	1.00	0.81
Interest rate (%)	139,560	0.98	1.48	2.24	1.77
Maturity (in years)	125,699	4.94	6.80	10.52	8.11
Number of employees	133,632	11	16	25	20
Balance sheet total (in thousands)	108,080	1	5	1,245	4,154
Annual turnover (in thousands)	141,152	2	4	304	164,006
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	706,677	47	107	246	281
Number of banks	706,677	1	1	1	1
Share from main bank	706,677	1.00	1.00	1.00	0.95
Herfindahl index	706,677	1.00	1.00	1.00	0.93
Interest rate (%)	669,494	1.22	1.67	2.42	1.98
Maturity (in years)	636,337	5.52	7.23	13.53	9.53
Number of employees	392,245	1	2	4	3
Balance sheet total (in thousands)	489,881	125	293	570	846
Annual turnover (in thousands)	554,297	20	153	364	80,702

Table A5: Summary statistics by size: Germany

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	11,182	87	1,390	9,913	16,415
Number of banks	11,182	1	2	4	3
Share from main bank	11,182	0.61	0.96	1.00	0.81
Herfindahl index	11,182	0.50	0.92	1.00	0.75
Interest rate (%)	10,418	0.89	1.68	2.58	1.99
Maturity (in years)	7,331	4.89	8.05	14.89	10.37
Number of employees	10,432	250	367	681	1,736
Balance sheet total (in thousands)	10,061	20,326	56,713	133,982	827,443
Annual turnover (in thousands)	9,760	29,193	77,082	178,329	439,636
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	39,765	70	527	2,365	2,853
Number of banks	39,765	1	2	3	2
Share from main bank	39,765	0.73	1.00	1.00	0.86
Herfindahl index	39,765	0.60	1.00	1.00	0.82
Interest rate (%)	37,972	1.28	2.03	3.16	2.47
Maturity (in years)	28,975	4.83	7.59	12.25	9.55
Number of employees	38,957	54	73	112	85
Balance sheet total (in thousands)	38,323	2,634	6,880	15,081	27,334
Annual turnover (in thousands)	32,734	4,559	10,097	20,760	23,316
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	121,985	37	141	534	876
Number of banks	121,985	1	1	2	2
Share from main bank	121,985	0.85	1.00	1.00	0.90
Herfindahl index	121,985	0.75	1.00	1.00	0.87
Interest rate (%)	117,608	1.66	2.65	4.38	3.34
Maturity (in years)	88,436	4.46	6.48	10.42	8.83
Number of employees	119,656	11	17	27	20
Balance sheet total (in thousands)	116,651	610	1,405	3,179	6,204
Annual turnover (in thousands)	98,637	1,069	2,110	4,032	24,706
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	153,980	31	98	480	757
Number of banks	153,980	1	1	1	1
Share from main bank	153,980	1.00	1.00	1.00	0.95
Herfindahl index	153,980	1.00	1.00	1.00	0.94
Interest rate (%)	150,380	1.76	2.74	4.59	3.69
Maturity (in years)	114,123	4.97	9.51	16.93	11.45
Number of employees	147,504	1	2	5	3
Balance sheet total (in thousands)	113,673	189	494	1,273	5,667
Annual turnover (in thousands)	109,758	150	426	869	31,179

Table A6: Summary statistics by size: Greece

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	440	299	5,454	19,340	17,812
Number of banks	440	1	2	4	3
Share from main bank	440	0.52	0.83	1.00	0.76
Herfindahl index	440	0.44	0.71	1.00	0.70
Interest rate (%)	435	3.04	3.73	5.33	5.71
Maturity (in years)	301	3.95	6.65	10.55	7.59
Number of employees	434	250	356	615	679
Balance sheet total (in thousands)	425	44,329	70,532	179,301	235,205
Annual turnover (in thousands)	438	26,252	58,026	132,452	172,190
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	1,759	262	1,298	4,306	3,395
Number of banks	1,759	1	2	3	2
Share from main bank	1,759	0.57	0.87	1.00	0.78
Herfindahl index	1,759	0.47	0.78	1.00	0.73
Interest rate (%)	1,750	3.56	4.38	5.48	5.38
Maturity (in years)	1,290	4.61	6.96	10.23	8.00
Number of employees	1,753	52	72	110	85
Balance sheet total (in thousands)	1,690	5,972	12,394	21,868	17,678
Annual turnover (in thousands)	1,740	4,620	10,078	18,913	14,771
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	7,242	77	224	630	663
Number of banks	7,242	1	1	2	2
Share from main bank	7,242	0.72	1.00	1.00	0.86
Herfindahl index	7,242	0.59	1.00	1.00	0.82
Interest rate (%)	7,239	4.04	5.14	6.57	5.61
Maturity (in years)	4,705	5.00	8.01	12.76	9.35
Number of employees	7,225	10	15	25	18
Balance sheet total (in thousands)	6,271	1,240	2,288	4,145	3,582
Annual turnover (in thousands)	7,123	834	1,896	3,629	2,812
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	18,469	36	73	164	172
Number of banks	18,469	1	1	1	1
Share from main bank	18,469	1.00	1.00	1.00	0.95
Herfindahl index	18,469	1.00	1.00	1.00	0.93
Interest rate (%)	18,467	3.58	5.32	7.35	5.47
Maturity (in years)	12,853	7.15	12.01	17.55	12.87
Number of employees	17,437	0	2	4	3
Balance sheet total (in thousands)	10,466	229	532	1,074	870
Annual turnover (in thousands)	16,755	99	267	638	503

Table A7: Summary statistics by size: Ireland

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	837	19	89	1,587	6,035
Number of banks	837	1	1	2	1
Share from main bank	837	1.00	1.00	1.00	0.96
Herfindahl index	837	1.00	1.00	1.00	0.94
Interest rate (%)	751	1.38	3.43	6.48	5.11
Maturity (in years)	306	3.00	4.54	6.33	5.20
Number of employees	699	250	374	770	2,952
Balance sheet total (in thousands)	698	22,604	65,446	285,605	2,010,412
Annual turnover (in thousands)	665	31,824	89,603	278,089	2,541,808
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	2,557	19	179	1,320	1,349
Number of banks	2,557	1	1	1	1
Share from main bank	2,557	1.00	1.00	1.00	0.96
Herfindahl index	2,557	1.00	1.00	1.00	0.95
Interest rate (%)	2,411	2.45	3.50	5.05	4.73
Maturity (in years)	1,300	4.56	6.74	9.97	7.43
Number of employees	2,458	55	75	112	88
Balance sheet total (in thousands)	2,509	3,809	9,835	16,526	16,234
Annual turnover (in thousands)	2,052	6,244	12,808	23,364	18,328
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	9,404	18	82	326	372
Number of banks	9,404	1	1	1	1
Share from main bank	9,404	1.00	1.00	1.00	0.96
Herfindahl index	9,404	1.00	1.00	1.00	0.95
Interest rate (%)	9,160	3.29	4.45	6.48	5.37
Maturity (in years)	5,288	4.89	6.97	10.02	7.95
Number of employees	8,700	11	16	26	19
Balance sheet total (in thousands)	9,365	678	1,611	3,190	2,730
Annual turnover (in thousands)	5,333	1,056	2,193	3,708	3,417
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	18,068	13	36	96	163
Number of banks	18,068	1	1	1	1
Share from main bank	18,068	1.00	1.00	1.00	0.99
Herfindahl index	18,068	1.00	1.00	1.00	0.98
Interest rate (%)	17,780	3.80	5.50	6.95	5.72
Maturity (in years)	10,365	4.51	5.01	9.98	7.21
Number of employees	11,982	2	3	6	4
Balance sheet total (in thousands)	17,649	122	302	681	676
Annual turnover (in thousands)	6,383	182	634	1,372	1,889

Table A8: Summary statistics by size: Italy

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	8,187	159	1,191	14,446	16,213
Number of banks	8,187	2	3	7	5
Share from main bank	8,187	0.45	0.75	1.00	0.71
Herfindahl index	8,187	0.33	0.62	1.00	0.64
Interest rate (%)	8,140	0.72	1.55	3.09	2.21
Maturity (in years)	5,924	2.92	4.66	6.64	5.49
Number of employees	7,947	11	161	323	793
Balance sheet total (in thousands)	7,794	59,020	104,368	235,800	488,571
Annual turnover (in thousands)	7,877	63,198	108,391	230,256	1,777,372
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	24,557	300	1,843	5,131	3,931
Number of banks	24,557	2	4	6	4
Share from main bank	24,557	0.41	0.65	1.00	0.67
Herfindahl index	24,557	0.30	0.52	1.00	0.59
Interest rate (%)	24,486	0.91	1.71	2.99	2.22
Maturity (in years)	20,028	2.97	4.73	7.00	5.68
Number of employees	24,137	33	60	85	66
Balance sheet total (in thousands)	23,719	9,230	14,937	25,202	23,268
Annual turnover (in thousands)	23,892	7,736	15,256	26,806	20,045
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	118,495	100	354	969	835
Number of banks	118,495	1	2	4	3
Share from main bank	118,495	0.55	0.82	1.00	0.76
Herfindahl index	118,495	0.44	0.70	1.00	0.70
Interest rate (%)	118,417	1.56	2.58	3.92	2.95
Maturity (in years)	96,142	3.17	5.00	8.70	6.48
Number of employees	115,259	10	14	20	16
Balance sheet total (in thousands)	106,610	1,223	2,529	4,501	4,207
Annual turnover (in thousands)	110,069	1,063	2,303	4,340	3,573
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	422,670	32	74	189	212
Number of banks	422,670	1	1	2	2
Share from main bank	422,670	0.83	1.00	1.00	0.90
Herfindahl index	422,670	0.72	1.00	1.00	0.87
Interest rate (%)	422,545	2.40	3.63	5.32	4.12
Maturity (in years)	322,301	4.00	5.04	10.06	7.64
Number of employees	404,317	1	2	4	3
Balance sheet total (in thousands)	282,157	217	473	970	1,562
Annual turnover (in thousands)	330,128	139	328	704	707

Table A9: Summary statistics by size: Netherlands

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	1,299	124	1,837	13,439	25,683
Number of banks	1,299	1	1	2	2
Share from main bank	1,299	0.88	1.00	1.00	0.91
Herfindahl index	1,299	0.79	1.00	1.00	0.88
Interest rate (%)	1,168	1.11	2.34	3.82	3.88
Maturity (in years)	489	10.01	15.01	20.01	15.14
Number of employees	1,283	328	516	1,012	957
Balance sheet total (in thousands)	1,291	0	440	6,383	36,155
Annual turnover (in thousands)	1,282	0	827	4,082	12,065
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	4,808	65	431	1,571	7,015
Number of banks	4,808	1	1	1	1
Share from main bank	4,808	1.00	1.00	1.00	0.98
Herfindahl index	4,808	1.00	1.00	1.00	0.97
Interest rate (%)	4,560	1.32	2.26	3.79	4.11
Maturity (in years)	886	5.04	8.96	13.50	10.19
Number of employees	4,750	60	80	120	95
Balance sheet total (in thousands)	4,798	41	130	512	3,525
Annual turnover (in thousands)	4,743	91	222	634	1,772
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	20,316	68	207	542	1,293
Number of banks	20,316	1	1	1	1
Share from main bank	20,316	1.00	1.00	1.00	0.99
Herfindahl index	20,316	1.00	1.00	1.00	0.99
Interest rate (%)	20,002	1.95	2.81	3.91	3.57
Maturity (in years)	3,251	5.10	9.62	13.61	10.40
Number of employees	20,065	13	18	27	21
Balance sheet total (in thousands)	20,257	10	23	62	329
Annual turnover (in thousands)	20,015	19	41	101	212
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	66,684	53	146	392	612
Number of banks	66,684	1	1	1	1
Share from main bank	66,684	1.00	1.00	1.00	1.00
Herfindahl index	66,684	1.00	1.00	1.00	0.99
Interest rate (%)	66,177	2.32	3.12	4.15	3.58
Maturity (in years)	11,881	6.65	10.02	17.39	12.34
Number of employees	61,814	0	1	3	2
Balance sheet total (in thousands)	62,432	3	10	29	59
Annual turnover (in thousands)	61,714	1	7	25	46

Table A10: Summary statistics by size: Portugal

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	926	220	2,334	10,062	11,676
Number of banks	926	2	4	6	4
Share from main bank	926	0.50	0.76	1.00	0.72
Herfindahl index	926	0.37	0.63	1.00	0.65
Interest rate (%)	913	0.53	1.38	2.70	2.27
Maturity (in years)	484	3.70	4.96	6.99	5.61
Number of employees	887	278	392	660	821
Balance sheet total (in thousands)	803	21,840	53,667	121,556	289,697
Annual turnover (in thousands)	802	21,546	47,601	103,121	147,894
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	4,743	204	892	2,802	2,483
Number of banks	4,743	2	3	5	3
Share from main bank	4,743	0.49	0.74	1.00	0.72
Herfindahl index	4,743	0.37	0.60	1.00	0.65
Interest rate (%)	4,711	1.10	1.77	2.96	2.58
Maturity (in years)	3,591	3.92	4.98	6.86	5.62
Number of employees	4,616	58	76	114	92
Balance sheet total (in thousands)	3,823	3,251	8,000	15,920	14,506
Annual turnover (in thousands)	3,814	3,494	7,426	15,110	12,324
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	23,018	62	175	483	498
Number of banks	23,018	1	2	3	2
Share from main bank	23,018	0.60	0.97	1.00	0.81
Herfindahl index	23,018	0.51	0.94	1.00	0.76
Interest rate (%)	22,942	1.63	2.52	3.85	3.29
Maturity (in years)	18,619	4.00	5.00	6.66	5.77
Number of employees	22,521	12	16	25	20
Balance sheet total (in thousands)	16,754	527	1,200	2,645	2,518
Annual turnover (in thousands)	16,686	602	1,180	2,491	2,119
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	53,291	32	61	144	194
Number of banks	53,291	1	1	2	1
Share from main bank	53,291	1.00	1.00	1.00	0.92
Herfindahl index	53,291	1.00	1.00	1.00	0.90
Interest rate (%)	52,969	2.13	3.16	4.55	3.83
Maturity (in years)	41,526	4.00	5.26	7.38	6.47
Number of employees	49,736	2	3	6	4
Balance sheet total (in thousands)	34,217	119	261	572	592
Annual turnover (in thousands)	33,448	88	215	463	393

Table A11: Summary statistics by size: Spain

	No.	p25	p50	p75	mean
<i>(a) Large firms</i>					
Outstanding amount (in thousands)	4,379	416	3,307	15,260	20,167
Number of banks	4,379	2	3	6	4
Share from main bank	4,379	0.41	0.67	1.00	0.67
Herfindahl index	4,379	0.29	0.53	1.00	0.60
Interest rate (%)	3,586	0.56	0.96	1.63	1.43
Maturity (in years)	2,285	3.10	5.09	7.53	6.37
Number of employees	4,162	167	328	576	685
Balance sheet total (in thousands)	4,217	31,172	66,599	143,022	355,419
Annual turnover (in thousands)	4,178	26,382	68,476	145,640	218,664
<i>(b) Medium firms</i>					
Outstanding amount (in thousands)	17,466	245	1,122	3,788	3,459
Number of banks	17,466	1	3	5	4
Share from main bank	17,466	0.43	0.69	1.00	0.68
Herfindahl index	17,466	0.31	0.55	1.00	0.61
Interest rate (%)	14,876	0.77	1.22	1.95	1.76
Maturity (in years)	11,955	3.05	5.04	8.52	6.78
Number of employees	17,240	51	68	104	80
Balance sheet total (in thousands)	17,343	3,784	10,853	19,728	20,507
Annual turnover (in thousands)	17,213	3,920	10,350	20,695	15,561
<i>(c) Small firms</i>					
Outstanding amount (in thousands)	85,107	81	241	676	721
Number of banks	85,107	1	2	3	2
Share from main bank	85,107	0.55	0.87	1.00	0.77
Herfindahl index	85,107	0.46	0.77	1.00	0.71
Interest rate (%)	72,828	1.16	1.85	2.83	2.32
Maturity (in years)	61,154	3.52	5.72	11.39	7.98
Number of employees	84,626	11	15	23	17
Balance sheet total (in thousands)	84,969	701	1,709	3,338	3,455
Annual turnover (in thousands)	84,615	793	1,596	3,304	2,644
<i>(d) Micro firms</i>					
Outstanding amount (in thousands)	260,443	38	80	184	231
Number of banks	260,443	1	1	2	1
Share from main bank	260,443	0.91	1.00	1.00	0.90
Herfindahl index	260,443	0.83	1.00	1.00	0.88
Interest rate (%)	218,299	1.63	2.66	3.88	2.99
Maturity (in years)	180,077	5.00	10.01	15.76	11.48
Number of employees	257,518	0	2	4	3
Balance sheet total (in thousands)	259,386	157	345	758	950
Annual turnover (in thousands)	256,335	54	201	475	390

Table A12: Summary statistics of instruments by size

	No.	p25	p50	p75	mean	Firms (%)
<i>(a) Large firms</i>						
Loans	25,955	186,928	1,443,768	8,833,740	14,938,787	60.91%
Credit lines	12,260	302,856	1,922,659	7,590,907	10,169,434	28.77%
Finance leases	11,995	46,783	140,676	628,126	1,340,983	28.15%
Trade receivables	17,114	78,458	336,782	1,816,110	3,260,926	40.17%
Revolving credit	28,317	2,633	30,788	1,119,077	3,436,898	66.46%
<i>(b) Medium firms</i>						
Loans	94,025	159,432	616,987	2,190,877	2,811,213	65.20%
Credit lines	42,754	175,131	618,966	2,000,000	2,224,224	29.65%
Finance leases	36,820	40,406	98,724	335,063	485,733	25.53%
Trade receivables	37,689	60,548	250,000	972,724	964,466	26.14%
Revolving credit	104,141	2,707	40,817	490,324	760,464	72.22%
<i>(c) Small firms</i>						
Loans	404,209	59,499	173,749	508,610	664,929	68.12%
Credit lines	147,593	62,500	196,139	612,168	735,565	24.88%
Finance leases	122,489	30,921	60,715	152,710	213,484	20.64%
Trade receivables	108,636	40,571	118,003	309,793	283,566	18.31%
Revolving credit	422,645	2,536	31,385	148,619	212,514	71.23%
<i>(d) Micro firms</i>						
Loans	1,422,992	35,117	82,186	205,651	258,776	72.70%
Credit lines	324,162	35,275	97,000	284,161	402,398	16.56%
Finance leases	189,723	26,681	40,551	84,072	136,127	9.69%
Trade receivables	164,889	13,690	34,219	79,750	89,858	8.42%
Revolving credit	1,090,505	2,055	14,679	45,202	80,301	55.71%

Note: The last column, Firms (%), shows the percentage of firms using the instrument. The total percentage per size class does not sum to 100% because one firm can use multiple instruments and is counted in each.

B Size class classification

We use Bureau van Dijk's Orbis to incorporate external firm-size characteristics which we use for firm size classification. To ensure the data quality we apply the following filters. First, we retrieve information only for EA countries. Second, we extract the unconsolidated codes (U1 and U2), as well as the code for firms which have only consolidated reports (C1), but no dependent entities.²² Third, we retrieve files up to June 2019 and choose the nearest date for which we have 12-month financial statements. Finally, due to numerous duplicate files for each firm, we apply distinct logic to several key characteristics of the financial statements:

- Filing type - we prefer 'Annual report' over 'Local filing', if both are available
- Consolidation code - we apply in order of preference the codes U1, U2 and C1, with U1 being the first choice if available.
- Audit status - we prefer audited files if available.²³
- Accounting practice - we prefer the 'Local GAAP' over 'IFRS9' and missing values.

To utilize all available information on balance sheet, number of employees, and annual turnover, we apply the following logic:

1. If all three firm characteristics are available or only the number of employees and one of the remaining two, then we apply the official definition of the European Union (as described above).
2. If only the number of employees is not available, then we apply the official definition of the European Union (as described above) only to the balance sheet size or the annual turnover, depending on which has the higher value.

²²According to the Orbis Data Guide, companies with detailed financial data can have 4 consolidation codes - U1 (statement not integrating the statements of the possible controlled subsidiaries or branches of the concerned Company with no consolidated companion), U2 (statement not integrating the statements of the possible controlled subsidiaries or branches of the concerned Company with an consolidated companion), C1 (statement of a mother Company integrating the statements of its controlled subsidiaries or branches with no unconsolidated companion), C2 (statement of a mother Company integrating the statements of its controlled subsidiaries or branches with an unconsolidated companion)

²³The order we establish among all options is the following: Unqualified, Qualified, No opinion, Unaudited, Audit n.a., missing value, Self-disclosed.

3. If only one of the three characteristics is available, then we apply the official definition of the European Union (as described above) only to that characteristic. For instance, if we have only the number of employees available and it has a value of 150, then the firm will be classified as medium sized.

By utilizing both data sources and applying the official definition of the European Union for the size classes we manage to classify 85.0% of the firms in AnaCredit in December 2019.

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