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a cross-country analysis

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THE DROP IN NON-FINANCIAL FIRMS' COST OF CREDIT: A CROSS-COUNTRY ANALYSIS

by Paolo Finaldi Russo and Fabio Parlapiano *

Abstract

Following the sovereign debt crisis, bank interest rates charged to non-financial firms declined sharply in the euro area. This work explores the firms' balance-sheet channel hypothesis on the role played by firms' characteristics and risk profile in the transmission of monetary policy. Using a European firm-level survey, we find that in all countries changes in borrowers' characteristics played a non-negligible role. They account for 30 out of 267 basis points of the total interest rate drop in Italy, 36 out of 160 basis points in core European countries and less than 20 out of 306 basis points in other vulnerable economies. The key firm characteristic driving the decline in interest rates in Italy and in other vulnerable countries is the improvement in the financial situation of non-financial firms, whereas in core countries the decline is mainly due to a shift in bank credit towards relatively older and larger borrowers.

JEL Classification: G20, G30.

Keywords: interest rates, SAFE, financial constraints, credit rationing.

Contents

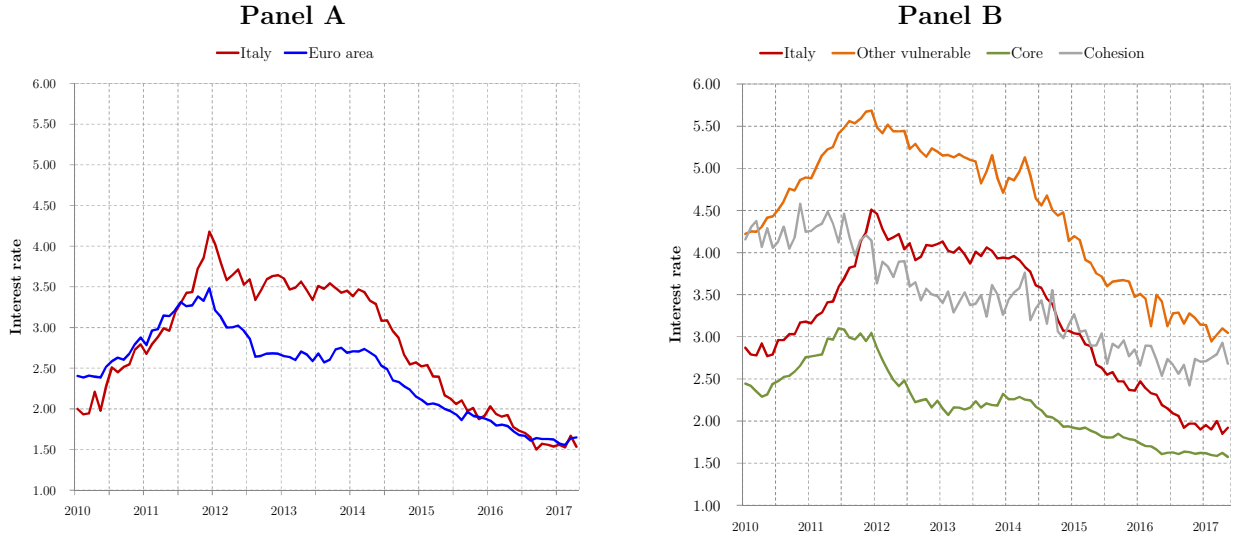
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* Bank of Italy, Research, Economics and Statistics Department, Via Nazionale 91, 00182, Rome, Italy.

1. INTRODUCTION¹

Since the sovereign debt crisis peaked at the end of 2011, bank interest rates on new loans to European non-financial firms have declined sharply following the implementation of conventional and unconventional monetary policy measures taken by the European Central Bank to tackle the crisis (ECB, 2017). In Italy and other vulnerable countries more severely hit by the sovereign debt crisis, the drop has been larger than in ‘core’ and ‘cohesion’ countries (Figure 1).²

Figure 1: Bank interest rates on new loans to non-financial corporations
(percentage points)



Source: ECB, harmonized statistics, MIR data. Notes: Non-financial corporations' total cost of borrowing on new business.

Recent studies have analysed the causes of this decline in bank interest rates, focusing on the effect of monetary policy on banks' balance-sheet conditions and on lending activity, i.e. the bank lending channel. Acharya et al. (2017) show that the intervention of the ECB (in particular the Outright Monetary Transactions) had a positive impact on banks' balance sheets (supply shock), and that these effects were larger in vulnerable economies than in other countries, thus allowing a more pronounced decline in interest rates on corporate loans. Consistently, a study by Albertazzi et al. (2016) indicates that (ex-ante) weaker banks'

¹ We are grateful to Giorgio Gobbi, Francesco Columba and Silvia Magri. All errors are our own. The views expressed in this paper are solely those of the authors and do not necessarily reflect the views of the Bank of Italy or of the Eurosystem.

² Following the European Investment Bank grouping criteria, we use the term 'core countries' to denote the less crisis-hit 'older' member states: Austria, Belgium, Germany, Finland, France, Luxembourg and the Netherlands; 'vulnerable countries' to denote the more crisis-hit 'old' members: Cyprus, Greece, Italy, Spain, Ireland, Slovenia and Portugal; and 'cohesion countries' for mostly 'new' member states: Estonia, Lithuania, Latvia, Malta and Slovakia.

balance-sheet conditions fostered the transmission of monetary stimulus, especially in the case of conventional monetary policy measures.

In this paper, we investigate to what extent improvements in borrowers' creditworthiness (demand shock) also contributed to the decline in bank interest rates in the period 2014-16, following the prediction of the firms' balance-sheet channel literature on the transmission of monetary policy.³ Accordingly, Ferrando et al. (2015) show that after the ECB unconventional monetary policy measures the improvement in credit supply was more pronounced for creditworthy firms. However, while they focus on volumes and types of credit, our paper focuses on interest rates charged by the banks.

We highlight the role of firms' characteristics in explaining the dynamics of interest rates, comparing (unconditional) average interest rates at the country group level to (conditional) estimates of average interest rates that take into account several corporate characteristics and change in risk profile (i.e. sector, age, turnover, economic performance and financial conditions). Following this comparison, we derive the proportion of the change in interest rates predicted by firm-level factors and, as a residual, the proportion relating to other factors attributable to developments in the monetary and macroeconomic environment. Although our paper is not a fully-fledged analysis on the determinants of interest rates, it provides descriptive evidence of the effects of borrowers' characteristics on interest rate changes, leaving aside important macroeconomic factors that typically influence the level of interest rates (i.e. ECB official interest rates, GDP growth and banks' balance-sheet conditions).

Our findings, based on information collected by the ECB/EC in the Survey on Access to Finance of Enterprises (SAFE), are twofold. First, we show that borrowers' characteristics accounted for a non-negligible share of the decline in interest rates charged to non-financial firms, both in Italy and in other countries. Over the period 2014-16, we estimate that firms' characteristics explained about 11 per cent of the overall decline in Italy, while in core and other vulnerable countries those shares were 23 and 6 per cent respectively. Second, the firm-level factors that contributed most to the drop in interest rates were strikingly different across countries: borrowers' balance sheets strengthened relatively more in Italy and in other vulnerable economies than in core countries, where, instead, a composition effect caused by a shift in bank credit toward relatively older and larger borrowers dominated.

The rest of the work is organized as follows: the second section presents a descriptive analysis of interest rates on credit lines and shows the link between their level and borrowers' characteristics in different countries. The third section presents our econometric analysis of interest rates and robustness and the fourth section concludes.

³ Previous evidence on the role of borrowers' creditworthiness and balance sheet in the transmission of monetary policy include De Bondt (2004), Ashcraft and Campello (2007), Jimenez et al. (2012), Aysun and Hepp (2013) and Igan et al. (2017).

2. DESCRIPTIVE ANALYSIS

Interest rates on credit lines and overdrafts charged to non-financial firms have been recorded in the SAFE since the first semester of 2014. Survey participants are asked to report the interest rate on new credit lines granted in the semester preceding the survey round.⁴ For the specific purpose of our study, information based on the flows of new loans allows a more accurate analysis of interest rate dynamics as data based on stocks could be affected by the cost of outstanding loans granted in the past with longer maturities. In addition, credit lines are a source of financing widely used by euro-area firms: about 40 per cent of respondents rely on it and about 16 per cent of the volume of bank finance to non-financial corporations consists of credit lines.

Table 1: Change in interest rates between 2014-H1 and 2016-H2

(percentage points)

Source	Italy	Other vulnerable	Core	Cohesion
SAFE	- 2.67	- 3.06	- 1.60	- 1.74
MIR	- 1.46	- 1.77	- 0.64	- 0.42

Source: ECB/EC, SAFE micro dataset, and ECB harmonized statistics, MIR data. Notes: Non-financial corporation interest rates on credit lines and overdrafts (SAFE) and interest rates on rolling debt and overdrafts (MIR), averaged by survey wave and country group. See footnote 3 for the country group members.

Table 1 shows that cross-country changes in average interest rates from survey data on firms' access to finance are consistent overall with the changes computed on aggregate data reported by monetary and financial institutions statistics (Figure 1). SAFE data confirm that the group of vulnerable countries experienced the largest decline, followed by core and cohesion countries (Figure 2.A).

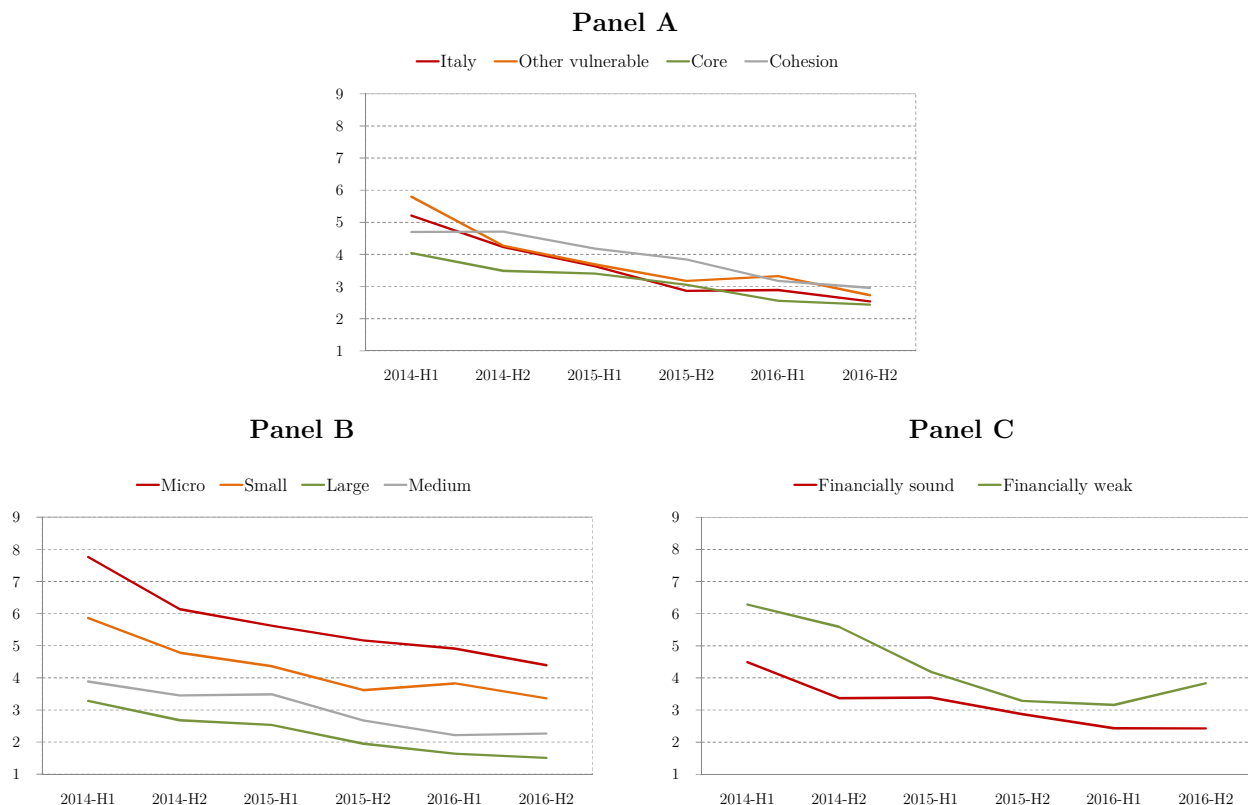
As expected, interest rates on credit lines are higher for small and financially weaker firms (Figures 2.B and 2.C).⁵ Micro firms were charged double the interest rates of large

⁴ The ECB/EC Survey on Access to Finance for Small and Medium-sized Enterprises (SAFE) dataset includes about 18,000 firms in each semi-annual survey wave. The sample is a rotating panel of firms stratified by country, size and economic sector. SMEs represent more than 90 per cent of surveyed firms; for Germany, France, Italy and Spain the sample size is set at 1,500 firms in each country. Because observations in survey samples may represent very different numbers of units in the original population, sampling weights are used to restore the proportions of each stratum in the population: following the methodology adopted by the ECB in the survey reports, we use an inverse-probability weighting scheme, i.e. each respondent unit receives a weight that is inversely related to the probability of being included in the sample.

⁵ From an asset pricing perspective, the default risk premium is the expected return on a defaultable corporate bond in excess of the risk-free rate. Fama and French (1993) provide early evidence that the cross-section of bond returns is largely explained by this risk factor. In the context of the European bond market, Berndt and Obreja (2007) find firm-level determinants to include actual default probabilities, firm size and the market-to-book ratio.

firms, while financially riskier firms recorded interest rates one and a half times higher than those applied to sounder firms. Borrowers' characteristics also correlate with the magnitude of the decline in interest rates: for small and financially vulnerable firms interest rates decreased at a faster pace, -2.4 and -2.6 percentage points, compared with the -1.7 and -1.9 recorded by large and financially sound firms. These stylized facts point to the possible role of borrowers' characteristics in explaining cross-country differences in the downward trend in bank interest rates.

Figure 2: Interest rates on credit lines by country, size and risk
(percentage points)



Source: ECB/EC, SAFE micro dataset. Notes: Non-financial corporation interest rates on credit lines and overdrafts averaged by survey wave, size and risk. In Panel C we classify firms as financially unsound if they report a combined deterioration in credit history, leverage ratio and profitability in the six months before the survey round.

3. ECONOMETRIC ANALYSIS

3.1. Modelling framework

In this section we investigate whether borrowers' characteristics and risk profile played a role in the decline in interest rates in Italy and other euro-area countries. Our identification strategy is based on the calculation of averages at the country-group level of firms' interest rates with two models that differ only as regards the inclusion of firm-level variables. By doing so, we derive the effects of borrowers' characteristics on interest rates by comparing the two measures. One limiting aspect is that, although our dataset has a panel

structure, individual fixed effects cannot be exploited effectively for two reasons: firstly, most of our explanatory variables are categorical and the usual de-meaning approach cannot be performed; secondly, the rotating structure of our dataset reduces the number of firms for which there are multiple observations (about 2,900 out of 6,811 and for only 553 firms there are at least two years of data).

We first estimate average interest rates by country group in each time period using the following unconditional model:

$$i_{ic\tau} = \alpha + \gamma_{ic\tau} + \varepsilon_{ic\tau}, \quad (1)$$

where $i_{ic\tau}$ is the interest rate applied to firm i in country-group c at time τ . In the case of the unconditional model, time-varying country effects ($\gamma_{ic\tau}$) are equal to the observed interest rate average by country group at each point in time.

Secondly, we augment model (1) to account for firms' characteristics (economic sector, age, turnover, export share and ownership) and proxies for default risk (changes in credit history, leverage and profit margin) using the following conditional model:

$$i_{ic\tau} = \alpha + \gamma_{ic\tau} + \sum_{j=1}^J \beta_j \mathbf{X}_{ic\tau} + \varepsilon_{ic\tau}, \quad (2)$$

where $\mathbf{X}$ is the set of firm-level controls. In the case of the conditional model, time-varying country effects capture, as residuals, those effects that are not attributable to the borrowers' characteristics included in the model. Thus, a comparison of time-varying country effects from models (1) and (2) ought to provide a measure of the contribution of borrowers' characteristics in explaining the decline in bank interest rates in each country group.

This identification strategy relies on both *i*) the quality of firm-level controls included in the model, and *ii*) the assumption that credit supply-side shocks are of similar magnitude within country groups. We draw from SAFE a large set of borrowers' characteristics collected as categorical variables, such as economic sector, age, turnover, ownership structure, export, main financial needs, and changes in credit history, leverage and profit margin.⁶ Table A.1 in the Appendix reports descriptive statistics at the country-group level.

Almost 90 per cent of the firms included in our sample are SMEs. Cross-country heterogeneity in firm size is quite low, although the share of Italian micro and small firms (as well as that of firms in the lower buckets of turnover) is larger than in other countries (67 per cent compared with a 55 per cent euro-area average). Italian firms also display low complexity in their ownership structure, which is clearly dominated by family firms.

⁶ The use of other firm-level variables, such as balance-sheet information or financial data provided by credit registers, is hindered by the anonymized structure of the survey, which does not allow precise matching with other data sources.

Our set of controls includes information relating to the use of finance (namely the purpose for which firms applied for new financial resources) and financial risk. While the use of finance is not immediately related to the pricing of a credit line, which usually serves a short-term purpose, it might be a proxy for other borrowers' characteristics. For example, it is plausible that the use of bank credit for debt rollover necessities reflects the case of distressed firms whose operating cash flows are not sufficient to meet current expenses. In contrast, the balance sheet of a firm that presents investment opportunities and successfully obtains funds to undertake such projects may signal lower default risk to the lender.

Other information relating to firms' financial risk can be gauged from survey responses addressing firms' changes in credit history, leverage and profit margin. Summary statistics in Table A.1 show that over the 2014-16 period the shares of new borrowers in Italy with deteriorating financial conditions were higher than the euro-area average.

One of the advantages of using survey data is that we are able to control for financial constraints, a typically unobservable source of bias in the analysis of the credit market. Respondents were asked to report the outcome of their credit applications over the previous semester, distinguishing between accepted (received all or over 75 per cent), partially accepted (received below 75 per cent), rejected, and refused by the firm because the cost was too high. We categorize firms as partially rationed if their application was partially accepted, rejected or refused owing to the high cost (called self-rationed, see also Ferrando et al., 2015). The information on financially constrained firms plays a crucial role in our analysis, as missing data on interest rates for these firms implies a non-random selection bias into the estimation sample. If there are unobservable factors affecting the loan demand process and these are correlated with the unobservable factors driving the interest rate applied to a firm, then estimates of models (1) and (2) could be biased due to an omitted variables problem. Ex-ante there are no priors on the direction of this bias, given that both a financially sound firm with high cash flow and a severely distressed one may decide not to apply for a loan. Thus, we use SAFE information on firms' financing constraints to address the potential bias caused by the non-random selection of firms in our sample in two ways:

- (i) by including among other controls in model (2) a variable that captures financing constraints. As suggested in Tucker (2010), this specification allows us to remove the bias when it is due to observable characteristics, and
- (ii) by means of Heckman's (1979) selection model.⁷

⁷ In the case of Heckman's model, a two-stage regression approach is adopted. In the first stage, or selection equation, the probability of a firm applying for credit is estimated in a standard probit setting. A bias correction term, namely the inverse Mill's ratio (IMR), is retrieved from the first stage and added to the second stage, or outcome equation (4). The IMR provides an estimate of unobservable for firms that demand a loan, and by using this estimate in the outcome equation inconsistencies due to correlation between error term and covariates are mitigated.

In the latter case, the selection (3) and outcome (4) equations are specified as follows:

$$credit\ demand_{ic\tau} = \alpha + \gamma_{c\tau} + \sum_{j=1}^J \beta_j \mathbf{X}_{ic\tau} + \gamma\ credit\ need_{ic\tau} + v_{ic\tau} \quad (3)$$

$$i_{ic\tau} = \alpha + \gamma_{c\tau} + \sum_{j=1}^J \beta_j \mathbf{X}_{ic\tau} + \lambda IMR_{ic\tau} + \varepsilon_{ic\tau}. \quad (4)$$

Correct identification of the selection model relies on the exclusion restriction assumption, i.e. on the presence of one additional variable in the selection equation that affects the probability of loan demand, but is not included in the outcome equation covariates ($\mathbf{X}_{ic\tau}$) as it has no relationship with the interest rate charged by banks. Following Holton et al. (2014), we use information on firms' credit need, as reported in the survey, to identify the model in (3) - (4). Credit need is a dummy variable that identifies firms with increasing need for bank loans; this is a predictor of credit demand (with a correlation coefficient of about 0.4). While firms with higher credit need could also present a credit demand function that is less elastic to the cost of credit, and therefore be charged higher interest rates, in our sample the empirical correlation between credit need and interest rates is fairly weak (0.05), corroborating its validity for the purpose of Heckmans' model.

3.2. Results

We estimate models (1) and (2) using interest rates reported in the SAFE for six semesters over the period 2014-16. The final dataset includes 6,811 firm-semester observations drawn from a rotating panel of about 17,000 firms. Tables A.2 and A.3 in the Appendix report estimates of the two models.⁸

By adding the estimated constant terms and time-varying country effects $\widehat{\gamma}_{c\tau}$ we obtain unconditional and conditional average interest rate levels by country group.⁹ In **Table 2** we report interest rate changes between 2014-H1 and 2016-H2 using both estimates. In all

⁸ When dealing with complex surveys, which involve sampling weights and stratification, Cameron (2015) recommends the use of Weighted Least Squares (WLS) without SE adjustments due to stratification and the use of cluster-robust SE for inference as usual. We use cluster robust SE to account for possible autocorrelation in residuals following the approach of Petersen (2009) and previous works that used SAFE micro dataset, such as Casey and O'Toole (2014) and Ferrando et al. (2015).

⁹ Note that unconditional WLS estimates of interest rates (Table A.3, column 1) are by construction equal to averages by country group at each time period, therefore providing a picture consistent with the descriptive analysis. Conditional estimates of interest rates (Table A.4) are higher than their unconditional counterpart; this is because, by controlling for firms' characteristics, the constant term in model (2) represents the interest rate of firms belonging to the base group. Specifically, the base group includes 'industrial' for the sectoral category, 'one owner only' for the ownership, 'more than 10 years' for the age; 'up to 0.5 million' for the turnover and 'not exporter' for the export category.

country groups, conditional estimates are lower than their unconditional counterparts; in the case of Italy, the two changes equal 267 and 237 basis points respectively. We interpret the 30 basis point difference as the effect of Italian borrowers' characteristics and risk profile on the decline in average interest rates, accounting for about 11 per cent of the total interest rate drop in Italy. Similarly, in the case of core countries this effect is equal to 36 basis points, with respect to a total change in interest rates of 160 basis points (23 per cent). In other vulnerable and cohesion countries the role of changes in firms' characteristics is less pronounced.

Estimates based on Heckman's model provide us with average interest rate estimates as if we had observed interest rates for all firms included in the sample, including those that did not apply for credit. By accounting for selection bias, both unconditional and conditional models provide higher estimates of interest rates by an average of 20 basis points. This means that firms that did not obtain credit in the period 2014-16 (partially rationed, self-rationed and non-applicants) were on average riskier than those that did apply and obtain credit. Interest rate changes decomposed according to Heckman's model result in similar outcomes for the importance of firms' characteristics in explaining the decline in interest rates.

Overall, while previous evidence on the role played by macro factors in driving most of the decline in bank interest rates after the sovereign debt crisis is corroborated by our analysis, our findings also point to a significant role played by borrowers' characteristics and risk profile.

Table 2: Decomposing interest rate changes between 2014-H1 and 2016-H2
(basis points and per cent)

Country group	Unconditional	Conditional	Difference	
	model	model	(basis points)	(percentage)
<i>Panel A: WLS estimates</i>				
	<i>1</i>	<i>2</i>	<i>3 = 1-2</i>	<i>4 = 3/1</i>
Italy	-267	-237	-30	11%
Other vulnerable	-306	-287	-19	6%
Core	-160	-124	-36	23%
Cohesion	-174	-159	-15	9%
<i>Panel B: Heckman's model estimates</i>				
Italy	-268	-238	-30	11%
Other vulnerable	-308	-289	-19	6%
Core	-167	-129	-38	23%
Cohesion	-179	-158	-21	12%

Source: Our calculations based on ECB/EC, SAFE micro dataset. Notes: Table 2 reports changes in average interest rates applied to non-financial firms by country group (column 1); the component of the overall change predicted by the conditional model (column 2); the component of the overall change attributable to a change in firms' characteristics (column 3), computed as the difference between column 1 and 2; and the incidence of firms' characteristics in the overall change in interest rates (column 4), computed as the ratio between column 3 and 4. In Panel A calculations are based on model (1)-(2), while in Panel B calculations are based on Heckman's model in (3)-(4).

We explore further the role of firm-level factors by investigating the variables that accounted most for the decline in interest rates. In Table 3 we report the predicted change in interest rates for each group of firm-level factors, computed as the estimated WLS coefficients reported in Table A.3 times the change in mean values of firm controls reported in Table A.4 $\left(\sum_{j=1}^J \beta_j * \Delta \mathbf{X}_{c\tau}\right)$.

Table 3: Contribution of firms' characteristics to interest rate changes
(basis points)

Firm controls	Italy	Other vulnerable	Core	Cohesion
Sector	2	1	-1	0
Ownership	2	3	-1	4
Age	-6	-4	-4	-4
Turnover	4	5	-18	-1
Export	2	2	0	0
Use of finance	-7	-6	-2	-1
Financial risk	-5	-4	-4	-5
Financial constraints	-23	-15	-8	-8
Total change	-30	-19	-36	-15

Source: Our calculations based on ECB/EC, SAFE micro dataset. Notes: Table 3 decomposes the change in interest rates attributable to firms' characteristics into its elementary determinants, that is the firm-level regressors in (2). The change in firms' characteristics over the period 2014-16 is multiplied by the corresponding estimated parameter to obtain the change in interest rates predicted by firms' characteristics.

Improved firms' access to finance was a major factor driving the reduction in interest rates across European countries, especially more vulnerable ones. Indeed, in the case of Italy the proportion of firms reporting episodes of partial credit rationing decreased from 32 to 11 per cent in 2014-16; the drop was far more pronounced than in other countries (Table A.4). The strengthening of firms' financial conditions contributed markedly to the decrease in interest rates. For Italian firms, our proxies for default risk, i.e. lower financial risk and use of finance, accounted for about 12 of the 30 basis point decline; similarly, for firms in other vulnerable countries they accounted for 10 out of 19 basis points.

Firms in core countries display a different picture. The strengthening of financial conditions accounted for only 4 out of a 36 basis point drop, whereas the greatest contribution came from a change in borrowers' composition. In particular, the shift in credit supply towards relatively larger (by turnover) and older firms entailed a decrease in interest rates of 22 basis points.

The contribution of firms' characteristics to interest rate changes highlighted in Table 3 assumes that firms' characteristic are priced similarly across countries. To check the sensitivity of our results to this assumption, we perform model (1) and (2) estimates in different country group samples; estimates are reported in Table A.5. Results do not change qualitatively, indicating that firms' characteristics have the same sign and similar magnitude across country groups.

4. CONCLUSIONS

This paper analyses the role of borrowers' characteristics, especially their financial conditions, in explaining the marked decline in bank interest rates after the sovereign debt crisis. We investigate *i*) whether firms' financial conditions or changes in borrowers' composition contributed to the interest rate drop observed in euro-area countries in 2014-16; *ii*) whether this contribution was of a different magnitude in Italy compared with the other vulnerable countries, the core euro-area economies and the cohesion countries; and *iii*) whether the main firms' characteristics explaining the drop in interest rates varied across countries.

The analysis is based on information collected each semester by the ECB/EC through the Survey on Access to Finance of Enterprises. We use firm-level interest rates charged on bank credit lines, a typical short-term credit facility that is highly responsive to credit market developments and changes in borrower risk profiles.

The results of the econometric analysis indicate that borrowers' characteristics (such as economic sector, age, turnover, ownership structure, export and main financial needs) and changes in their financial conditions (financial constraints, changes in credit history, leverage and profit margin) played a non-negligible role in the drop in interest rates charged to non-financial firms after the sovereign debt crisis. In Italy the characteristics of these firms accounted for about 11 per cent of the total interest rate drop recorded in 2014-16 (i.e. 30 basis points); in core countries the contribution of firms' characteristics was even greater at 23 per cent (36 basis points). Finally, in other vulnerable economies and cohesion countries, firm factors explained between 6 and 9 per cent of the total decline respectively.

Interestingly, the borrowers' characteristics that contributed most to the drop in interest rates vary greatly between Italy and other vulnerable countries and the core countries. In the former group, the improvement in firms' financial conditions following the crisis was by far the strongest driver of the interest rate drop. In core countries, instead, the decline was due to a shift in bank credit towards larger and relatively older firms, which are typically charged lower interest rates.

Overall, these results suggest that the firms' balance-sheet channel could have been at work in the recent interest rate drop, contributing to the transmission of monetary policy alongside the bank lending channel. However, as our database does not allow us to control for firms' and banks' characteristics at the same time, we are not able to identify the effects on interest rates of the two channels separately. This aspect could be the subject of future research.

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Table A.1: Firms' distribution by characteristics

Variable		Eurozone	Italy	Other Vulnerable	Core	Cohesion
Interest rate		3.43%	3.55%	3.86%	3.16%	3.93%
Size						
	Micro	19%	30%	22%	13%	19%
	Small	19%	21%	20%	17%	17%
	Medium	18%	15%	17%	20%	21%
	Large	44%	33%	41%	50%	42%
Sector						
	Industrial	13%	20%	12%	11%	16%
	Construction	6%	8%	7%	5%	8%
	Trade	15%	16%	19%	13%	18%
	Services	21%	23%	21%	20%	16%
	NA	44%	33%	41%	50%	42%
Ownership						
	One owner only	20%	16%	16%	22%	25%
	Family or entrepreneurs	49%	57%	52%	46%	29%
	Business associates	15%	16%	17%	14%	19%
	Public shareholders	3%	1%	3%	3%	9%
	Venture capital	0%	0%	0%	0%	0%
	Others	5%	7%	3%	4%	3%
	NA	8%	4%	7%	10%	15%
Age						
	10Y +	88%	86%	88%	89%	82%
	5Y to 10Y	9%	11%	9%	8%	13%
	2Y to 5Y	2%	2%	3%	2%	4%
	Less than 2Y	1%	1%	1%	1%	1%
	NA	0%		0%	0%	0%
Turnover						
	Up tp 0.5 m	12%	18%	15%	8%	16%
	0.5 m to 1 m	7%	10%	8%	6%	8%
	1 m to 2 m	7%	9%	9%	6%	6%
	2 m to 10 m	17%	18%	20%	16%	20%
	10 m to 50 m	21%	17%	25%	21%	33%
	More than 50 m	34%	29%	24%	43%	17%
	NA	0%	0%	0%	1%	0%
Export						
	0% - not exporter	40%	40%	40%	40%	32%
	Less than 25%	26%	23%	29%	25%	23%
	25 to 50%	14%	14%	11%	16%	13%
	Over 50%	19%	22%	19%	17%	31%
	NA	1%	0%	0%	1%	1%
Use of Finance						
	Investment	49%	45%	33%	59%	43%
	Working capital	58%	62%	71%	50%	70%
	Innovation	19%	20%	15%	21%	17%
	Refinancing or debt roll over	22%	8%	20%	28%	22%
Financial risk						
	Credit history deteriorarion	11%	13%	9%	11%	10%
	Leverage deterioration	29%	32%	27%	28%	25%
	Profit deterioration	32%	38%	28%	32%	28%
Financial constrains						
	Partial rationing	13%	18%	15%	9%	9%
	Observations	6811	1268	2241	2891	411

Source: ECB/EC, SAFE micro dataset. Notes: Table A.1 reports firms' characteristics by country group for the period 2014-16.

Table A.2: Unconditional model estimates

Variables		Wls (1)		Selection model (2)			
				Outcome eq.	Selection eq.		
	Constant	5.2076***	(18.34)	5.4265***	(0.287)	0.3897***	(0.103)
Italy							
	2014-H2	-0.978***	(-2.79)	-0.952**	(0.374)	-0.119	(0.141)
	2015-H1	-1.577***	(-4.82)	-1.613***	(0.358)	0.2089	(0.147)
	2015-H2	-2.342***	(-7.36)	-2.363***	(0.344)	0.2255	(0.143)
	2016-H1	-2.314***	(-6.77)	-2.348***	(0.364)	0.2134	(0.146)
	2016-H2	-2.670***	(-7.87)	-2.681***	(0.358)	0.1343	(0.150)
Other vulnerable							
	2014-H1	0.5850	(1.51)	0.5577	(0.392)	0.1544	(0.139)
	2014-H2	-0.936***	(-2.82)	-0.997***	(0.337)	0.3090**	(0.134)
	2015-H1	-1.516***	(-4.41)	-1.554***	(0.348)	0.1710	(0.132)
	2015-H2	-2.032***	(-5.88)	-2.096***	(0.349)	0.3146**	(0.131)
	2016-H1	-1.882***	(-3.78)	-1.894***	(0.502)	0.0342	(0.140)
	2016-H2	-2.477***	(-7.74)	-2.518***	(0.324)	0.2614*	(0.133)
Core							
	2014-H1	-1.167***	(-3.19)	-1.075***	(0.371)	-0.337***	(0.125)
	2014-H2	-1.720***	(-5.1)	-1.647***	(0.343)	-0.268**	(0.124)
	2015-H1	-1.802***	(-4.74)	-1.736***	(0.386)	-0.247**	(0.125)
	2015-H2	-2.151***	(-6.09)	-2.095***	(0.358)	-0.189	(0.125)
	2016-H1	-2.648***	(-8.28)	-2.584***	(0.326)	-0.265**	(0.124)
	2016-H2	-2.768***	(-8.37)	-2.747***	(0.334)	-0.115	(0.126)
Cohesion							
	2014-H1	-0.507	(-0.75)	-0.461	(0.686)	-0.176	(0.201)
	2014-H2	-0.496	(-0.77)	-0.569	(0.652)	0.3481	(0.257)
	2015-H1	-1.027	(-1.36)	-1.045	(0.760)	0.2190	(0.192)
	2015-H2	-1.363**	(-2.5)	-1.448***	(0.552)	0.5140*	(0.283)
	2016-H1	-2.033***	(-4.75)	-2.039***	(0.438)	0.1283	(0.197)
	2016-H2	-2.246***	(-4.02)	-2.249***	(0.568)	-0.000	(0.235)
Heckmans' parameters							
	CreditNeed					0.8406***	(0.840)
	athrho					-0.166***	(-0.16)
	lnsigma					1.1729***	(1.172)
	rho					-0.165***	(-0.16)
	sigma					3.2313	(3.231)
	lambda			-0.533***	(-0.53)		
Observations							
		6,811		9,692		9,692	
R-squared							
		0.0632					

Source: ECB/EC, SAFE micro dataset. Notes: Table A.2 reports weighted least squares estimates of unconditional model (1) in column 1, and Heckman's selection model estimates in column 2. Robust standard errors clustered at the firm level are shown in parenthesis.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.3: Conditional model estimates

Variables		Wls (1)		Selection model (2)			
				Outcome eq.		Selection eq.	
Panel A: Country-Time factors							
	Constant	7.000***	(0.350)	7.1830***	(0.333)	0.2751**	(0.132)
Italy							
	2014-H2	-0.759***	(0.283)	-0.741***	(0.282)	-0.168	(0.146)
	2015-H1	-1.184***	(0.274)	-1.202***	(0.281)	0.1648	(0.154)
	2015-H2	-1.817***	(0.267)	-1.833***	(0.274)	0.1924	(0.145)
	2016-H1	-1.889***	(0.271)	-1.903***	(0.282)	0.1463	(0.148)
	2016-H2	-2.371***	(0.273)	-2.378***	(0.273)	0.0712	(0.154)
Other vulnerable							
	2014-H1	0.664**	(0.322)	0.661**	(0.321)	0.0186	(0.142)
	2014-H2	-0.700**	(0.277)	-0.720***	(0.276)	0.1961	(0.135)
	2015-H1	-1.165***	(0.283)	-1.175***	(0.281)	0.0646	(0.133)
	2015-H2	-1.582***	(0.309)	-1.605***	(0.296)	0.1570	(0.134)
	2016-H1	-1.496***	(0.491)	-1.497***	(0.484)	-0.083	(0.141)
	2016-H2	-2.210***	(0.277)	-2.229***	(0.273)	0.1448	(0.139)
Core							
	2014-H1	-0.536*	(0.318)	-0.498	(0.316)	-0.329**	(0.128)
	2014-H2	-1.021***	(0.280)	-0.991***	(0.280)	-0.266**	(0.128)
	2015-H1	-0.759**	(0.348)	-0.735**	(0.348)	-0.189	(0.128)
	2015-H2	-1.510***	(0.290)	-1.502***	(0.288)	-0.128	(0.129)
	2016-H1	-1.858***	(0.267)	-1.834***	(0.266)	-0.200	(0.125)
	2016-H2	-1.777***	(0.282)	-1.790***	(0.279)	-0.073	(0.127)
Cohesion							
	2014-H1	-0.211	(0.650)	-0.193	(0.648)	-0.174	(0.216)
	2014-H2	-0.418	(0.524)	-0.451	(0.521)	0.1553	(0.242)
	2015-H1	-0.597	(0.723)	-0.611	(0.722)	0.1638	(0.188)
	2015-H2	-1.385***	(0.381)	-1.426***	(0.381)	0.4037	(0.262)
	2016-H1	-1.694***	(0.307)	-1.658***	(0.303)	0.0308	(0.200)
	2016-H2	-1.802***	(0.408)	-1.775***	(0.403)	-0.202	(0.247)

Source: ECB/EC, SAFE micro dataset. Notes: Table A.3 reports weighted least squares estimates of conditional model (2) in column 1, and Heckman's selection model estimates in column 2. Robust standard errors clustered at the firm level are shown in parenthesis.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.3: Conditional model estimates (continued)

Variables		Wls (1)		Selection model (2)			
				Outcome eq.		Selection eq.	
Sector	Panel B: Firm-level factors						
	Construction	-0.04	(0.192)	-0.034	(0.182)	0.0740	(0.069)
	Trade	-0.020	(0.148)	-0.029	(0.133)	0.0025	(0.051)
	Services	0.026	(0.158)	0.032	(0.144)	0.0730	(0.050)
	NA	-0.264	(0.193)	-0.286	(0.187)	0.1601**	(0.076)
Ownership							
	Family or entrepreneurs	-0.493***	(0.133)	-0.499***	(0.125)	-0.053	(0.044)
	Business associates	-0.806***	(0.172)	-0.821***	(0.164)	0.0316	(0.076)
	Public shareholders	-0.765**	(0.340)	-0.785**	(0.327)	0.0603	(0.160)
	Venture capital	0.908	(1.103)	0.922	(1.084)	-0.191	(0.210)
	Others	-0.733**	(0.335)	-0.768**	(0.328)	-0.125	(0.111)
	NA	0.131	(0.255)	0.127	(0.247)	-0.135	(0.120)
Age							
	5Y to 10Y	0.480*	(0.266)	0.4772**	(0.226)	-0.024	(0.069)
	2Y to 5Y	0.958**	(0.372)	0.997***	(0.371)	-0.159	(0.108)
	Less than 2Y	0.273	(0.561)	0.077	(0.496)	0.0665	(0.221)
	NA	-1.524**	(0.588)	-1.430**	(0.581)	-0.732	(0.528)
Turnover							
	0.5 m to 1 m	-0.148	(0.283)	-0.160	(0.275)	-0.061	(0.075)
	1 m to 2 m	-1.149***	(0.222)	-1.154***	(0.210)	-0.026	(0.073)
	2 m to 10 m	-1.728***	(0.203)	-1.735***	(0.193)	0.0107	(0.065)
	10 m to 50 m	-2.282***	(0.232)	-2.270***	(0.227)	-0.050	(0.077)
	More than 50 m	-2.937***	(0.306)	-2.932***	(0.301)	-0.001	(0.107)
	NA	-0.769	(0.677)	-0.730	(0.646)	-0.247	(0.216)
Export							
	Less than 25%	-0.154	(0.112)	-0.140	(0.104)	-0.048	(0.053)
	25 to 50%	-0.274*	(0.141)	-0.271*	(0.140)	0.0155	(0.074)
	Over 50%	-0.163	(0.151)	-0.159	(0.145)	0.0272	(0.069)
	NA	0.569	(0.684)	0.519	(0.595)	0.5151*	(0.276)
Use of finance							
	Investment	-0.569***	(0.100)	-0.528***	(0.095)	-0.267***	(0.045)
	Working capital	0.092	(0.101)	0.008	(0.102)	0.5306***	(0.046)
	Innovation	0.157	(0.109)	0.132	(0.114)	0.1292**	(0.059)
	Refinancing or debt roll over	0.597***	(0.125)	0.568***	(0.121)	0.1819***	(0.058)
Financial risk							
	Credit history deterioration	0.343*	(0.205)	0.337	(0.210)	-0.073	(0.069)
	Leverage deteriorarion	-0.075	(0.098)	-0.088	(0.104)	-0.040	(0.049)
	Profit deterioration	0.042	(0.108)	0.03	(0.108)	0.0045	(0.046)
Financial constrains							
	Partial rationing	1.127***	(0.168)	1.125***	(0.166)	-0.066	(0.060)
Heckmans' parameters							
	Credit need					0.799***	(0.051)
	athrho					-0.109***	(0.032)
	lnsigma					1.036***	(0.034)
	rho					-0.108***	(0.032)
	sigma					2.817	(0.096)
	lambda			-0.307***	(0.093)		
	Observations	6,811		9,692		9,692	
	R-squared	0.283					

Source: ECB/EC, SAFE micro dataset. Notes: Table A.3 reports weighted least squares estimates of conditional model (2) in column 1, and Heckman's selection model estimates in column 2. Robust standard errors clustered at the firm level are shown in parenthesis.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.4: Firms' characteristics by country

Firm controls		Italy		Other vulnerable		Core		Cohesion	
		2014 - H1	2016-H2	2014 - H1	2016-H2	2014 - H1	2016-H2	2014 - H1	2016-H2
Sector									
	Construction	9%	8%	7%	7%	5%	5%	8%	7%
	Trade	15%	19%	17%	20%	13%	12%	17%	21%
	Services	24%	25%	23%	23%	21%	20%	18%	11%
	NA	35%	26%	41%	37%	52%	54%	46%	47%
Ownership									
	Family or entrepreneurs	65%	54%	60%	52%	56%	50%	32%	26%
	Business associates	12%	16%	11%	15%	10%	14%	28%	27%
	Public shareholders	0%	2%	2%	3%	3%	4%	7%	5%
	Venture capital	1%	0%	0%	1%	0%	0%	0%	0%
	Others	8%	6%	4%	2%	3%	2%	0%	2%
	NA	3%	2%	7%	11%	7%	8%	15%	17%
Age									
	5Y to 10Y	14%	7%	7%	4%	10%	5%	10%	13%
	2Y to 5Y	3%	1%	4%	2%	3%	2%	8%	2%
	Less than 2Y	1%	1%		0%	3%	0%	2%	6%
	NA				0%				
Turnover									
	0.5 m to 1 m	11%	9%	9%	8%	8%	5%	8%	5%
	1 m to 2 m	7%	11%	10%	9%	5%	6%	5%	7%
	2 m to 10 m	20%	19%	15%	22%	13%	14%	16%	20%
	10 m to 50 m	18%	16%	25%	23%	19%	25%	39%	41%
	More than 50 m	25%	24%	25%	21%	42%	43%	16%	13%
	NA		0%	1%	1%	1%	0%		
Export									
	Less than 25%	24%	23%	38%	25%	24%	28%	27%	19%
	25 to 50%	18%	13%	9%	11%	18%	14%	15%	13%
	Over 50%	18%	18%	18%	18%	17%	16%	31%	40%
	NA		1%	0%	1%	2%	1%		
Use of Finance									
	Investment	35%	47%	27%	37%	60%	59%	39%	57%
	Working capital	55%	65%	73%	69%	53%	51%	53%	93%
	Innovation	17%	19%	16%	12%	16%	19%	18%	17%
	Refinancing or debt roll over	9%	7%	21%	22%	27%	24%	19%	29%
Financial Risk									
	Credit history deterioration	25%	10%	17%	6%	16%	7%	19%	2%
	Leverage deterioration	37%	27%	28%	25%	24%	25%	30%	27%
	Profit deterioration	50%	37%	33%	23%	42%	26%	23%	30%
Financial constraints									
	Partial rationing	32%	11%	24%	11%	12%	5%	14%	7%

Source: ECB/EC, SAFE micro dataset. Notes: Table A.4 reports for each country the proportion of firms displaying a certain characteristic.

Table A.5: Conditional model interest rate estimates by country

		Italy	Other Vulnerable	Core	Cohesion
Costant		4.6045***	5.1036***	4.9742***	6.1320***
Time					
	2014-H1	2.3528***	2.6679***	1.3381***	1.6895**
	2014-H2	1.6052***	1.4218***	0.7706***	1.2282*
	2015-H1	1.1704***	0.8395***	1.0666***	1.1934*
	2015-H2	0.5229**	0.5247***	0.3027	0.8322*
	2016-H1	0.5067**	0.5771*	-0.073	0.2728
Sector					
	Construction	0.3816	-0.478	-0.148	0.4544
	Trade	-0.084	0.0921	-0.136	0.9820*
	Services	-0.138	-0.174	0.1223	0.6449
	NA	-0.375	-0.352	-0.066	0.1593
Ownership					
	Family or entrepreneurs	-0.285	-0.477*	-0.705***	0.0931
	Business associates	-0.393	-1.175***	-0.900***	0.3076
	Public shareholders	-1.064*	-1.226**	-1.011*	1.5908
	Venture capital	5.3951	-1.054**	0.1471	1.8748**
	Others	-0.388	-1.353***	-0.794	-0.351
	NA	0.0313	-0.906**	0.2782	-0.000
Age					
	5Y to 10Y	0.3028	1.2815	0.1403	0.8113*
	2Y to 5Y	1.7698***	0.0281	0.9732	1.4154
	Less than 2Y	0.4012	2.0415	-0.294	1.6636
	NA		-4.195	-0.999**	1.7668*
Turnover					
	0.5 m to 1 m	-0.606*	-0.997**	0.4765	-2.013***
	1 m to 2 m	-1.606***	-1.543***	-0.981**	-2.487***
	2 m to 10 m	-2.347***	-2.134***	-1.139***	-4.755***
	10 m to 50 m	-2.700***	-2.537***	-1.866***	-4.699***
	More than 50 m	3.1923***	-2.623***	-2.841***	-5.961***
	NA		0.3145	-1.157*	-1.679
Export					
	Less than 25%	-0.728***	-0.135	-0.180	0.0025
	25 to 50%	-0.585**	-0.069	-0.263	0.6607
	Over 50%	-0.956	0.1543	-0.116	0.5319
	NA		0.4659	0.8385	-1.278
Use of Finance					
	Investment	-0.431***	-0.321*	-0.693***	-0.105
	Working capital	-0.151	-0.056	0.2670*	0.0033
	Innovation	-0.086	0.1957	0.2479	-0.244
	Refinancing or debt roll over	0.6011**	0.0885	0.6993***	-0.152
Financial Risk					
	Credit history deterioration	0.4746*	0.7357	0.1376	-0.324
	Leverage deterioration	0.2843*	-0.080	-0.175	-0.712
	Profit deterioration	-0.224	0.2610	0.0992	-0.119
Financial constraints					
	Partial rationing	1.0892***	1.9314***	0.6278***	0.5361
	R-squared	0.44	0.28	0.26	0.39
	N	1,268	2,241	2,891	411

Source: ECB/EC, SAFE micro dataset. Notes: Table A.5 model (1) estimates by country group.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.