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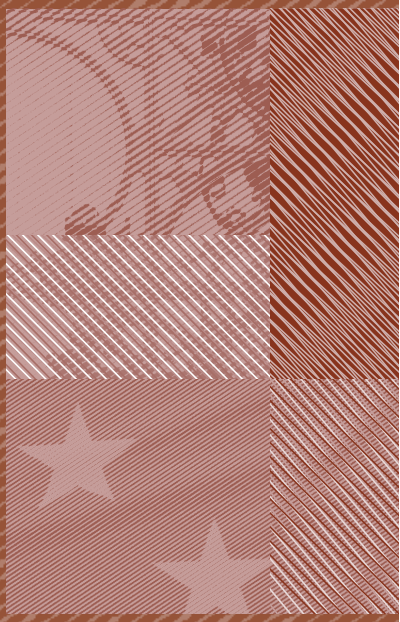

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Abstract

Little is known about the drivers and effectiveness of personal as opposed to real loan guarantees provided by firms. This paper studies a dataset of 477,209 loan contracts granted over the 2006-2014 period by one Spanish financial institution consisting of several distinguishable organisational units. While personal guarantees are mostly driven by the economic environment as reflected in firm and bank conditions, real guarantees are mostly explained by loan characteristics. In response to higher capital requirements imposed by the European authorities in 2011, personal guarantee requirements increased significantly more than their real counterparts. Our results imply that personal guarantees can discipline firms in their risk-taking, but their overuse can limit this positive effect and damage their performance.

Keywords: banks, asymmetric information, real guarantees, personal guarantees, risk-taking, capital requirements.

JEL classification: D43, E32, G21, G32.

Resumen

Poco se sabe todavía sobre los factores que determinan el uso de garantías personales en comparación con las garantías reales en el marco de los préstamos bancarios a empresas, así como sobre su posterior impacto en la toma de decisiones de las empresas. Este trabajo analiza 477.209 contratos de préstamos concedidos durante el período 2006-2014 por una institución financiera española compuesta por distintas unidades organizativas distinguibles a lo largo del tiempo. Mientras que el uso de garantías personales se determina principalmente por el entorno económico como reflejo de las condiciones de la empresa y del banco, el uso de las garantías reales se explica mayoritariamente por las características del préstamo. Como respuesta a los mayores requerimientos de capital impuestos por las autoridades europeas en 2011, el uso de las garantías personales se incrementó de forma mucho más acusada que el uso de las garantías reales. Nuestros resultados indican que las garantías personales pueden mitigar el riesgo que las empresas están dispuestas a asumir, pero su uso excesivo puede limitar este efecto e impactar negativamente sobre la rentabilidad de las empresas.

Palabras clave: banca, información asimétrica, garantías reales, garantías personales, toma de riesgos, requerimientos de capital.

Códigos JEL: D43, E32, G21, G32.

1. Introduction

Why are some bank loans collateralized with personal guarantees while other ones employ real assets? What are the specific firm and loan drivers behind this decision? Did the recent bank regulation have any impact on the guarantees required by banks? If so, what type of guarantee is being preferred and why? Do borrowers mitigate their risk and/or enhance their profitability due to the usage of a specific type of guarantee?

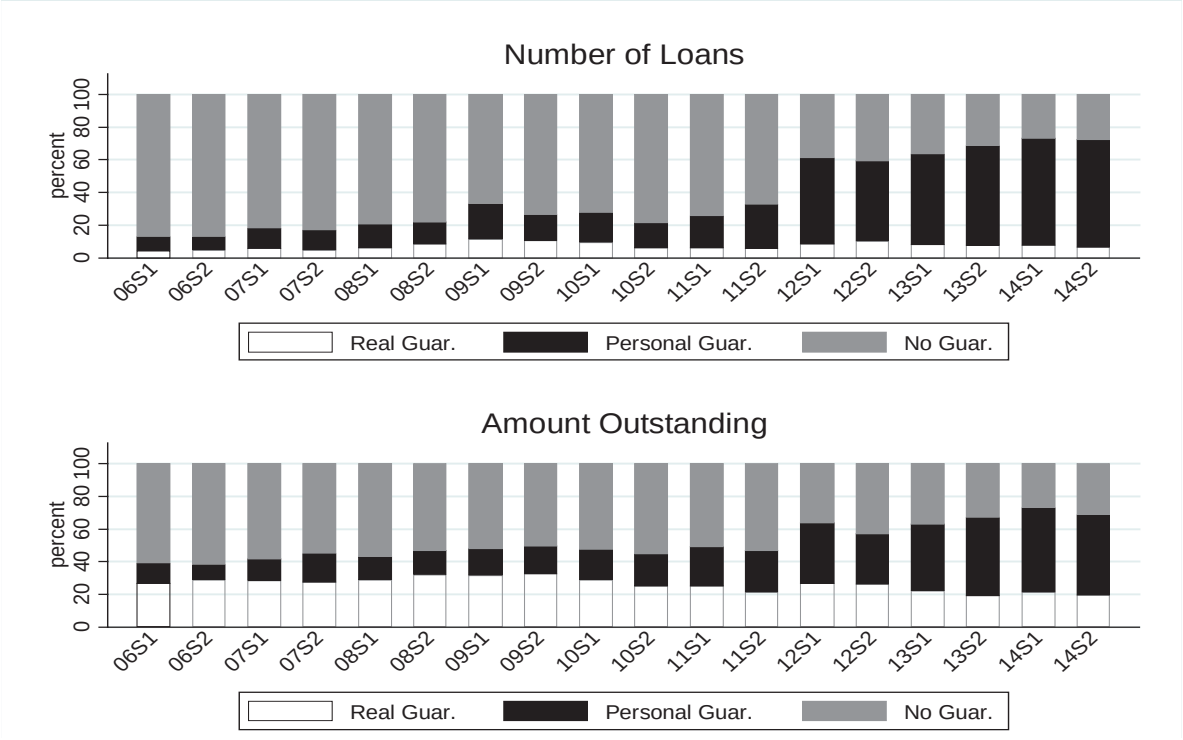
These questions lie at the heart of loan contract design, where asymmetric information problems remain pervasive (see the original theoretical contribution by Stiglitz and Weiss, 1981).[1] But in addition to their purpose of reducing adverse selection and moral hazard problems, banks actively manage collateral to mitigate risk and to improve regulatory capital ratios. As policy makers and regulators strive to reconcile financial stability with economic growth, an understanding of the trade-offs embedded in the use of a specific type of guarantee is of utmost importance for all economic agents. In this paper, we try to shed some light on all these questions through an empirical investigation.

Guarantees can take the form of *personal* or *real* guarantees. Personal guarantees entail the direct and joint liability of new guarantors, these being persons (e.g., firm's managers or third persons to the firm) or institutions (e.g., official institutions or mutual guarantees societies) whose solvency is sufficiently demonstrated as to ensure the full loan repayment in case of the borrower's default. In contrast, real guarantees simply refer to specific assets, such as real estate, financial or movable assets, that the lender can subsequently sell in the case of borrower's default.

[1] The theoretical literature illustrates that posting collateral protects against the two traditional types of asymmetric information, i.e., adverse selection (Bester, 1985; Besanko and Thakor, 1987) and moral hazard (Boot, Thakor, Udell, 1991). Empirical studies have widely confirmed the important role of reducing adverse selection and moral hazard as key drivers behind collateral use (e.g., Cole, Goldberg, White, 2002; Berger, Espinosa-Vega, Frame, Miller, 2011; and Bellucci, Borisov, Giombini, and Zazzaro, 2015).

Figure 1 depicts the evolution of personal and real guarantee requirements by a Spanish financial institution and its subsidiaries from 2006 to 2014. The first feature is that both the number and amount of loans without explicit guarantees significantly decrease over time. The second feature is the remarkable difference in terms of the use of personal and real guarantees. While, the amount collateralized through personal guarantees displays a significant increase, particularly after the second semester of 2011, the one corresponding through real guarantees remains stable. This increase in the use of personal guarantees is in agreement with the evidence illustrated in the survey conducted by the Spanish Chamber of Commerce about the SME access to finance.[2]

Figure 1: Evolution of the requirements of real and personal guarantees
Figure 1 depicts the evolution of the requirements of real and personal guarantees by a Spanish financial institution and its subsidiaries from 2006 to 2014. The first panel summarizes the evolution in terms of the proportion of loans with guarantees whereas the second panel summarizes the evolution of the amount collateralized through the two types of guarantees.



What explains the increasing requirements of guarantees and the recent preference towards personal guarantees? The increase of collateralized

[2] http://www.guitrans.eus/documentos/B_812_DOC2.pdf (in Spanish).

loans (no matter the guarantee type) is related, on the one hand, to the need to mitigate the credit risk in a context of uncertainty and weak global economic conditions. On the other hand, guarantees play a key role in capital regulation in which the assets weighted by their risk level are fundamental. In addition, there are several potential reasons supporting the increasing use of personal guarantees: First, most personal guarantees are executed more rapidly and efficiently through extrajudicial enforcement. This became particularly important in the crisis period due to the increase in the number of opened judicial process to foreclose real guarantees. Second, firms that had prior loans with the bank may be lacking real collateral (real estate or financial assets). Third, since real estate is the most frequent real guarantee, in case of execution, the bank's exposure to the real estate sector and the higher provisions implied could substantially increase. Finally, from a capital regulatory perspective, personal and real guarantees can be used to reduce the risk weighted assets (RWA) as long as they fulfill certain specified conditions. However, it is important to have in mind that for personal guarantees, the loan is guaranteed with the present and future wealth of the guarantor, and this could generate uncertainty, mainly in the medium- and long-run.

The empirical literature so far has mainly focused on the determinants of the use of real guarantees or collateral (e.g., Jiménez, Salas, and Saurina, 2006; Berger, Frame and Ioannidou, 2011). Yet, because of data limitations, little is still known about the determinants of personal guarantees usage and in general, about the differences between personal and real guarantees.

In this paper, we break new ground by examining the determinants behind the requirement of personal and real guarantees, their use to improve the bank loan portfolio credit risk and capital ratios, and the costs and benefits for the firm. To address these questions, we use a unique and proprietary dataset of 477,209 loan contracts granted over the 2006-2014 period by a Spanish financial institution and its subsidiaries.

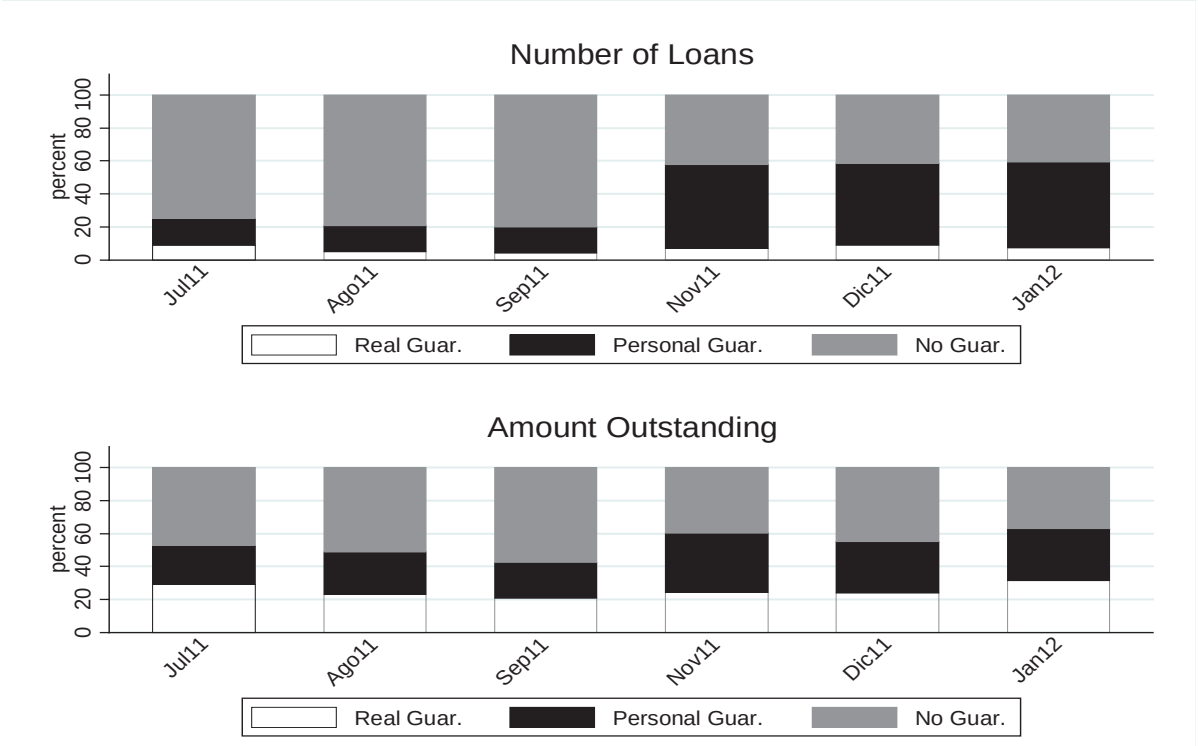
Our results show that personal guarantees are mostly driven by the economic environment as reflected in firm and bank conditions, whereas real guarantees are mostly explained by loan characteristics. The requirement of personal and real guarantees also differs along several other important dimensions. For instance, personal guarantees are typically employed in short and medium-term loans, whereas real collateral is increasingly prevalent at longer maturities. We also find that a higher loan amount increases the likelihood of using real collateral significantly more than personal guarantees. Thus, long-term large loans typically involve real guarantees, as it may be harder for firm managers to collateralize these loans with their net worth, because this tends to be more uncertain than the value of real assets. We also find that real collateral requirements are more likely for larger firms but less likely for more leveraged firm. Additionally, the distance between branch and bank headquarters increases the probability of pledging real or personal guarantees almost equally.

After characterizing the drivers of personal and real guarantees, we analyze the sizeable increase in the use of guarantees, especially the personal ones, after October 2011 (see Figure 2). The widespread use of personal guarantees after the previous date is the result of two coinciding events. First, the recommendations and measures following the July 2011 stress test results to improve capital ratios, in conjunction with the weak economic conditions, pushed the bank to enhance their loans' default and loss rates, which are key components of the credit risk analysis carried out under stress tests. In this respect, the use of guarantees can be seen as a way of aligning the bank and SMEs objectives (Aghion and Bolton, 1992; La Porta, López de Silanes, Sheleifer and Vishny, 1998) and, as a consequence, banks can reduce the loan default rates and the associated losses in case of final default. Second, in October 2011, the EU reached an agreement whereby European banks should increase their capital buffers by the summer of 2012 to improve the resilience of the banking system. This period is characterized by capital scarcity and thus, banks may display an incentive to minimize

the cost of this new requirement through an extensive use of guarantees. To understand the effectiveness of guarantees to improve the capital ratio, it is important to highlight that at that date the bank had adopted the advanced Internal Ratings Based (IRB) approach for its corporate and retail exposures. Under this system, there are no limits to the range of eligible guarantors. In addition, if the creditworthiness of the guarantor is sufficiently qualified to ensure the reimbursement of the principal and to provide a high enough coverage ratio, personal guarantees can be used to reduce the RWA. In sum, the mitigation of credit risk and the optimization of RWA together with the previously enumerated advantages of personal guarantees, can explain why this type of guarantee became so popular.

Figure 2: Evolution of the requirements of real and personal guarantees around October 2011

Figure 4 depicts the evolution of the requirements of real and personal guarantees by a Spanish financial institution and its subsidiaries around October 2011. The first panel summarizes the evolution in terms of the proportion of loans with guarantees whereas the second panel summarizes the evolution of the amount collateralized through the two types of guarantees.



The widespread usage of guarantees, which is not linked to solve asymmetric information problems but to accommodate capital requirements, could ultimately affect bank borrowers along two dimensions: Risk-taking and performance. In fact, we find that prior to October 2011 firms reduced their risk after being granted loans with personal guarantees. As personal guarantees often involve managers' net worth, they internalize potential losses thereby increasing their risk aversion towards investments and management in general to a higher extent than real guarantees. However, the overuse of personal guarantees after October 2011 could limit their effectiveness and could prevent some managers to invest in certain projects, thus affecting the efficiency of their investment decisions. The overuse of personal guarantees could, in the end, affect the firm profitability and, as a consequence, the real economy.

Even though personal and real guarantees have very different properties, only a handful of recent papers treat them separately.[3] Brick and Palia (2007) and Calcagnini, Farabullini and Giombini (2014) for example explore the differential effects of personal versus real collateral on the loan rate, while Pozzolo (2004), Voordeckers and Steijvers (2006), and Ono and Uesugi (2009) − like our paper − study their differential determinants. The first paper studies 52,000 bank credit lines that were granted in Italy between 1992 and 1996, and finds differences along relationship characteristics and firm risk in collateralization outcomes. The second paper studies a sample of 234 credit files in a large Belgian bank between 2000 and 2003, while the third paper accesses a 2002 Survey of the Financial Environment which covers 1,700 Japanese firms to investigate both the determinants of the use of personal/real guarantees and the relation between collateral usage and monitoring efforts by lenders.

[3] Udell (2015) makes a related point about *outside* (assets provided by someone outside the firm) versus *inside* (assets pledged by the firm) collateral. Recent papers focus on how changes in the law that facilitate real collateralization leads to an increase in borrowing and performance of firms (e.g., Calomiris, Larrain, Liberti, and Sturgess, 2015; Campello and Larrain, 2015; Cerqueiro, Ongena, Roszbach, 2016 a,b).

In contrast to these three studies, we assess many more possible drivers of personal and real collateralization, i.e., bank, loan, bank-firm, and firm characteristics, and distinguish across different time periods. We identify the differential effects of these drivers on the probability of requiring either personal or real guarantees. In addition, we analyze how the bank and its subsidiaries modify their guarantee policy to improve credit risk management and fulfill stricter capital requirement and how the type of guarantee affects firm risk-taking and profitability. This comprehensive analysis is only made possible thanks to the uniquely large and detailed data set we have access to.

Our results highlight the policy trade-offs faced by macro prudential regulation aiming at increasing the resilience of the banking system. On the one hand, banks can improve their loan portfolio's credit risk and their RWAs by resorting to the use of personal guarantees and this could contribute to improve the overall financial stability. On the other hand, the surge in the use of personal guarantees following October 2011 was not effective in enhancing the risk and profitability profile of new borrowers. So, this new pattern does not necessarily achieve the primary objective of mitigating credit risk and could even have a negative effect on the real economy.

The remainder of paper proceeds as follows. Section 2 describes the main features of our dataset. Section 3 explains the hypotheses formally tested in the paper. Section 4 shows and explains the empirical findings on the firm and loan characteristics that explain the use of personal or real guarantees. Section 5 provides evidence on the relation between guarantee policies and capital-adequacy bank management after 2011. Section 6 shows evidence on the relationships between the use of guarantees and the firm's risk and performance. Section 7 concludes.

2. Dataset

Our proprietary dataset comes from a Spanish financial corporation and its subsidiaries. It contains information on 477,209 loans granted between

February 2006 and November 2014. Besides the standard loan characteristics, the dataset contains information on the existence (or not) of a guarantee and the amount covered by the guarantee relative to the loan size. Information on guarantees includes the type of guarantee, either personal or real. In addition, our dataset contains the variables detailed below:

Firm characteristics:

- Total Assets: Logarithm of firm total assets in Euros.
- Financial Leverage: Ratio of firm total assets to stockholder's equity.
- ROA: Firm return on assets.
- Refinancing: Dummy that equals one when the firm is refinanced, and equals zero otherwise.

Bank[4]-Firm characteristic:

- Any Other Type of Contract: Dummy that equals one if the firm has other type of outstanding contracts with the bank (i.e., credit cards, credit lines, or other loans) when the loan is granted, and equals zero otherwise.

Bank characteristics:

- Branch-Headquarter Distance (organizational distance): Distance between the bank branch and the headquarters, measured in either the logarithm of kilometers or minutes.[5]

Loan characteristics:

- Loan Maturity: Logarithm of the loan maturity in months at origination.

[4] We use the term bank hereafter to refer to the parent bank and its subsidiaries given that they belong to the same organizational unit.

[5] Other papers study the effect of the physical distance (i.e., distance between the borrower and lender) on the use of guarantees. For instance, Bellucci, Borisov, Giombini, and Zazzaro (2015) find that more distant borrowers from the branch experience higher collateral requirements. We focus on organizational distance because the loans in our bank are decided at different hierarchical levels. Large loans granted to large firms are formalized in the main office in the province, region, or even in the bank national headquarters when the size of the loan/firm is high. Thus, a measure of physical distance to the deciding branch does not only reflect the real proximity but also the characteristics of the firm and loan size.

- Size: Logarithm of the loan amount in Euros.

We assess how representative our sample is in terms of its geographical distribution and the frequencies of various business activities. We first map firm location (by zip code) to both bank branch and headquarter locations. There are 5,117 zip codes and 3,200 municipalities where firms obtain loans (see Panel A of Table 1) and 1,088 municipalities with bank branches. Zip codes with firms in our dataset represent almost half of all the zip codes in Spain (i.e., 46 percent), while the branch zip codes represent almost three quarters (i.e., 71 percent) of all the zip codes in towns with more than 10,000 inhabitants. As shown in Panel B, the distribution of loans varies significantly across zip codes and municipalities. Panel C of Table 1 classifies firms by sector and size.[6] In comparison to the Spanish business activity, our sample overweights (underweights) the industry (services) sector, whereas in terms of the firm's size, our sample of SMEs is similar to the country average.

Panel A of Table 2 contains descriptive statistics on the contract characteristics. The average loan maturity is higher than one year (i.e., 18.42 months) but there are a considerable number of short-term loans, as the median maturity (3.95 months) reveals. Contrary to Jiménez, Salas, and Saurina (2006), who use loans with a maturity higher than one year and split the sample in two groups depending on the loan maturity (1-3 years and more than 3 years), we consider all the loans in the sample after treating potential rollovers.[7] The average loan size is around 100,000€ but it

[6] The thresholds applied in the size classification correspond to the European Commission Recommendation 2003/361/EC of 6 May 2003. Due to the lack of information relative to the number of employees, the classification of firms in our sample is based on total assets. Statistics relative to the Spanish business activity by sector and size come from the Instituto Nacional de Estadística (INE).

[7] A rollover loan is defined as one with less-than-1-year maturity, granted immediately after another short-run loan matures (next day), with the same amount, maturity and contracted in the same bank office than a previous loan. In an exercise available in the Internet Appendix, we examine whether this strategy to detect rollovers affects the results by analyzing loans with more-than-1-year maturity and find that it does not.

Table 1: Descriptive statistics on the loan representativeness at zip code and municipality level, sector and size

Panel A of Table 1 contains information on the number (No.) of zip codes and municipalities (muni.) with firms and bank branches in our sample, which spans from February 2006 to September 2014, joint with its representativeness over the whole country. Panel B of Table 1 contains descriptive statistics (mean, standard deviation, median, minimum, and maximum) of the loan activity by zip code and municipality. Panel C of Table 1 reports the firms in sample by sector and size and the comparable statistics to the whole economy. Inh.: inhabitants.

Panel A

	Units	Total
No. ZIP codes with firms	-	5,117
No. ZIP codes with branches	-	1,662
No. ZIP codes with firms/No. ZIP codes (in the Country)	%	45.63
No. ZIP codes > 10,000 inh. with branches/No. ZIP codes > 10,000 inh. (in the Country)	%	71.02
No. municipalities with firms	-	3,200
No. municipalities with branches	-	1,088
No. municipalities with firms/No. municipalities (in the Country)	%	39.41
No. muni. > 10,000 inh. with branches/No. muni. > 10,000 inh. (in the Country)	%	65.80

Panel B

	Units	Mean	SD	Median	Min	Max
No. received loans by ZIP code	000	0.35	0.52	0.13	0.00	5.19
No. granted loans by ZIP code	000	0.81	1.08	0.40	0.00	6.03
No. of received loans by municipality	000	1.76	6.00	0.24	0.00	33.42
No. of granted loans by municipality	000	4.23	11.11	0.61	0.00	47.33
No. of firms receiving loans by municipality	000	0.21	0.74	0.03	0.00	4.67

Panel C

By Sector

	Sample	Spain
Construction	19.02%	15.19%
Industry	25.28%	6.86%
Services	26.34%	53.78%
Trade	29.37%	24.17%

By Size

	Sample	Spain
SME	97.76%	99.84%
Large	2.24%	0.16%

varies substantially, ranging from 550€ to 3,000,000€, showing the wide heterogeneity of firms and loan types in the sample.

Panel B of Table 2 contains descriptive statistics on the use of guarantees and their characteristics. Personal guarantees are more often used than real guarantees in our sample. While 35 percent of the loans include a personal guarantee, only 8 percent of them have a real guarantee.[8] In terms of real guarantees, the most common ones are mortgages. As Panel B shows, the average coverage of personal guarantees relative to loan size is 163 percent.[9] For those loans with real guarantees, mortgage guarantees cover, on average, almost 100 percent of the loan size, while financial asset-based guarantees cover a much lower percentage of the loan size (61 percent, on average).

Descriptive statistics on firm characteristics are shown in Table 2, Panel C. The median firm obtains 2 loans from the bank during the 2006-2014 sample period, ranging between 1 and 2,419. The median firm has total assets of 2.07 million euros, a financial leverage ratio equal to 3.85, and a ROA of 0.46 percent. Additionally, the dataset contains information on whether loans are granted to previously refinanced firms (27 percent of all the sample loans). Our dataset contains information on all the other bank-firm contracts. We observe that 30 percent of the firms had other types of contracts with the bank (i.e., credit cards, credit lines, or other loans) when the loan was granted. This variable is used as a proxy for relationship lending, due to the implied effect of diminishing informational asymmetries. The organizational distance − both physical and in terms of traveling time − between bank branch and headquarters is relatively large, pointing towards a relevant source of asymmetric information. This reflects the distance between the different provinces in Spain and the financial center, located in

[8] Among the personal guarantees, the wide majority of them are associated to the firm itself (e.g., firm's managers). The ones associated with other institutions are much less frequent and represent around 1% of personal guarantees.

[9] The coverage ratio is obtained as the proportion of the loan size that is hedged by the guarantee associated with that risk.

Madrid. The maximum distance (above 2,589 km) is due to the fact that the Canary Islands are far away from the Iberian Peninsula.

Table 2: Descriptive statistics on firm and loan characteristics

Panel A of Table 2 contains descriptive statistics (mean, standard deviation, median, minimum, and maximum) on the contract characteristics. Panel B of Table 2 reports the descriptive statistics on the use of guarantees and their coverage ratios. Guarantee's information refers to the use of personal and real guarantees and each subtype of guarantees: personal guarantees provided by the firm or by other institutions and real guarantees in the form of mortgage or financial assets. Panel C of Table contains the descriptive statistics on several firm characteristics: number of loans granted, balance-sheet related characteristics (total assets, leverage, and ROA), the use of refinancing, the use of other type contracts (including other loans) with the bank when the loan was granted and the distance between the branch granting loan and the bank headquarters.

Panel A	Units	Mean	SD	Median	Min	Max
Loan Maturity	Months	18.42	35	3.95	0.69	225.8
Loan Size	000 Euro	104.16	303.91	27.57	0.55	3,000.00
Panel B	Units	Mean	SD	Median	Min	Max
Personal Guarantees	0/1	0.35	0.48	0	0	1
Real Guarantees	0/1	0.08	0.28	0	0	1
Real Guarantees - Mortgage	0/1	0.07	0.25	0	0	1
Real Guarantees - Financial assets	0/1	0.02	0.13	0	0	1
Real & Personal Guarantees	0/1	0.03	0.17	0	0	1
Personal Guarantees Coverage	%	163.29	94.58	100.00	0.01	1,300.00
Real Guarantees Coverage	%	94.71	28.56	100.00	0.01	411.06
Real Guarantees - Financial Assets Coverage	%	60.68	41.90	57.67	0.01	411.06
Real Guarantees - Mortgage Coverage	%	98.73	20.03	100.00	0.09	393.43
Panel C	Units	Mean	SD	Median	Min	Max
No. Loans	-	7.48	31.09	2	1	2,419
Total Assets	000,000 Euro	5.69	11.28	2.07	0.32	93.6
Leverage	-	9.58	30.31	3.85	-79.58	239.9
ROA	%	-0.82	8.7	0.46	-61.58	21.7
Refinancing	0/1	0.27	0.44	0	0	1
Any Other Type of Contract	0/1	0.3	0.46	0	0	1
Branch-Headquarter Distance	Kilometers	433.83	366.34	416.02	0.00	2,589.55
Branch-Headquarter Distance Time	Minutes	334.99	610.53	246.92	0.00	4,601.73

Table 3 shows the correlation among the dependent and explanatory variables. Correlations among explanatory variables are overall quite small, except the high positive correlation (50 percent) between the size of the loan and the maturity. Regarding the unconditional correlations between explanatory variables and guarantee dummies, a higher organizational distance is associated with a higher likelihood of posting personal and real guarantees. We also observe that loans with higher size and higher maturity are positively correlated with the likelihood of having personal and

real guarantees. In contrast, having other types of contracts is negatively related to having guarantees. At the firm level, higher leverage, being previously refinanced, lower total assets, and a smaller ROA all imply a higher likelihood of having to post personal and real guarantees.

Table 3: Correlations among the dependent and explanatory variables

This table contains the matrix of correlation among the dependent and explanatory variables. The first four variables represent the dependent variables. Variables [1] – [2] are dummy variables that take value one if the loan has personal and real guarantees, respectively. Variables [3] – [4] represent the coverage ratio of the personal and real guarantees, respectively. Variables [5] – [12] are the set of explanatory variables and are self-descriptive.

		Units	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1]	Personal Guarantees	0/1											
[2]	Real Guarantees	0/1	0.00										
[3]	Personal Guarantees Coverage	%	0.81	-0.03									
[4]	Real Guarantees Coverage	%	-0.02	0.95	-0.04								
[5]	Branch-Headquarter Distance	log	0.01	0.02	0.01	0.02							
[6]	Loan Maturity	log months	0.22	0.44	0.06	0.43	-0.02						
[7]	Loan Size	log	0.08	0.32	-0.03	0.31	-0.05	0.50					
[8]	Any Other Type of Contract	0/1	-0.19	-0.15	-0.14	-0.15	0.02	-0.29	-0.13				
[9]	Total Assets	log Eur	-0.17	-0.01	-0.15	-0.01	-0.02	-0.13	0.25	0.16			
[10]	Leverage	-	0.02	0.05	0.00	0.05	-0.02	0.04	0.03	-0.03	-0.01		
[11]	ROA	%	-0.02	-0.07	0.00	-0.07	0.02	-0.05	-0.01	0.10	0.02	0.00	
[12]	Refinancing	0/1	0.07	0.14	0.06	0.14	-0.03	0.04	0.01	-0.03	0.05	0.18	-0.02

3. Research Hypotheses

We explore three loan/firm dimensions that can differentially affect the use of personal and real guarantees. The first one is related to loan characteristics. As Table 2 reports, our sample consists of loans that range from less than one month of maturity to 226 months (almost 19 years). The banking literature (see Boot, Thakor, and Udell (1991) among others) argues that the longer the maturity, the more likely that the bank will request collateral to align the borrower and the lender incentives. However, the impact of maturity on the guarantees use could differ for the two types of guarantees. Personal guarantees depend on the firm's manager's present and future wealth. This can be a disadvantage for the bank especially in the case of long term loans, where there is more uncertainty in both the state of the economy and the financed project. This uncertainty affects the entrepreneur's wealth, suggesting the use of real instead of personal guarantees for long term loans. Thus, we expect personal guarantees to be typically employed in short and medium-term loans, where the uncertainty on the manager wealth is typically lower. In contrast, real collateral is expected to be increasingly prevalent at longer maturities.[10] A similar argument can be made with loan size: As loans become larger in size, the ability of personal guarantees covering a default is more uncertain. Banks will thus likely resort to real collateral in the context of sizable loans. In addition, the execution of personal guarantees in large loans can damage the managers' ability to pursue further entrepreneurial activities. In the context of bank-firm relationships, banks would then prefer not to place this extra-weight on companies.

Secondly, the requirement of personal and real guarantees could differ due to the firm credit quality and the overall economic conditions. The theoretical literature on moral hazard shows that when lenders observe borrowers' credit quality, low-quality borrowers obtain loans with collateral

[10] Indeed the data confirm that real guarantees are more prevalent for loans with maturity higher than 10 years, whereas personal guarantees are very common in short and medium-term loans.

and high-quality borrowers obtain loans without having to pledge collateral (Boot, Thakor, and Udell, 1991). By and large, the empirical literature confirms these theoretical insights (Jiménez, Salas, and Saurina, 2006). In their analysis of credit lines' collateralization and types of collateral employed, Voordeckers and Steijvers (2006) classify personal guarantees as the ones offering the highest level of protection. In fact, with personal guarantees the lender receives explicit claims on personal assets and/or future borrower's wealth. So, the likelihood of suffering personal losses for the borrower is much higher in the presence of personal guarantees, which could ultimately affect their risk-taking behavior. For this reason, we expect the bank to require personal guarantees when the economic conditions of the firm and/or the overall economy deteriorate.

The third dimension refers to the role of the bank-firm characteristics and concretely, to the distance between them. Banks can take decisions in centralized or decentralized ways. In the first case, the bank avoids delegation and agency costs. It favors the use of hard information and a more formal communication between the headquarters and the branches. Decentralized decisions taken at the branch level imply more autonomy in the loan granting process (i.e., assessment, approval, pricing…) and favor the use of soft information collected at the branch level. Both approaches imply organizational diseconomies (Stein, 2002) in the form of efficiency losses compared to the situation where there are no informational asymmetries. In our view, these diseconomies can induce headquarters to require guarantees based on hard information. For this reason, as the distance between the branch and the headquarter increases, the latter would be more tempted to prefer real guarantees requirements in loan contracts over personal guarantees.

Hypothesis 1: The use of personal and real guarantees is differently affected by several loan/firm dimensions such as the loan maturity and size, the firm credit quality, the overall economic conditions and the branch-headquarter (organizational) distance.

The sample period includes two events coinciding with a change in the bank guarantee policy. First, the recommendations and measures following the July 2011 stress test results, in conjunction with weak economic conditions, pushed banks to enhance their loan's default and loss rates and their regulatory capital requirements. After the announcement of the results, the national supervisory authorities (NSA) requested banks with a Core Tier 1 capital ratio below the 5% threshold under the adverse scenario to "promptly remedy this situation". In addition, banks with a ratio above 5% but close to the threshold under the adverse scenario "should provide a plan for remedial action". In both cases, the plan had to be provided by mid-October 2011 and implemented by mid-April 2012. Second, the EU reached an agreement that European banks should increase their capital buffers setting the minimum Core Tier 1 capital ratio in the 9 percentage. The objective of the capital exercise is to create an exceptional and temporary capital buffer to address current market concerns over sovereign risk. As a result of this measure, many banks (including the one under analysis) had to revise their capital policy and take operative measures to improve their common equity standards.[11]

Both events explain the increasing demand of guarantees since they can be seen as the natural instruments to decrease losses and to align the interest of creditors and debtors mitigating default rates (see Aghion and Bolton, 1992; La Porta, López de Silanes, Sheleifer and Vishny, 1998). Moreover, effective guarantees (i.e., guarantees that fulfill certain regulatory criteria) might contribute to improve the capital ratios by reducing the RWA. In fact, the EBA highlights the usefulness of the improvement in collateral and guarantees as a mitigating measure to reduce the RWAs.[12] In this context,

[11] For more information see:
http://www.eba.europa.eu/documents/10180/26923/Sovereign-capital-shortfall_Methodology-FINAL.pdf

[12] See detailed information on the impact of the use of guarantees and collateral on the reduction of RWA (page 13):
http://www.eba.europa.eu/documents/10180/15956/Finalreportrecapitalisationexercise.pdf/87602d3f-ec8d-4788-9aa8-fae0f28f4c23.

the question that arises is whether banks rely on guarantees to achieve their goals and whether they prefer the use of personal or real guarantees.

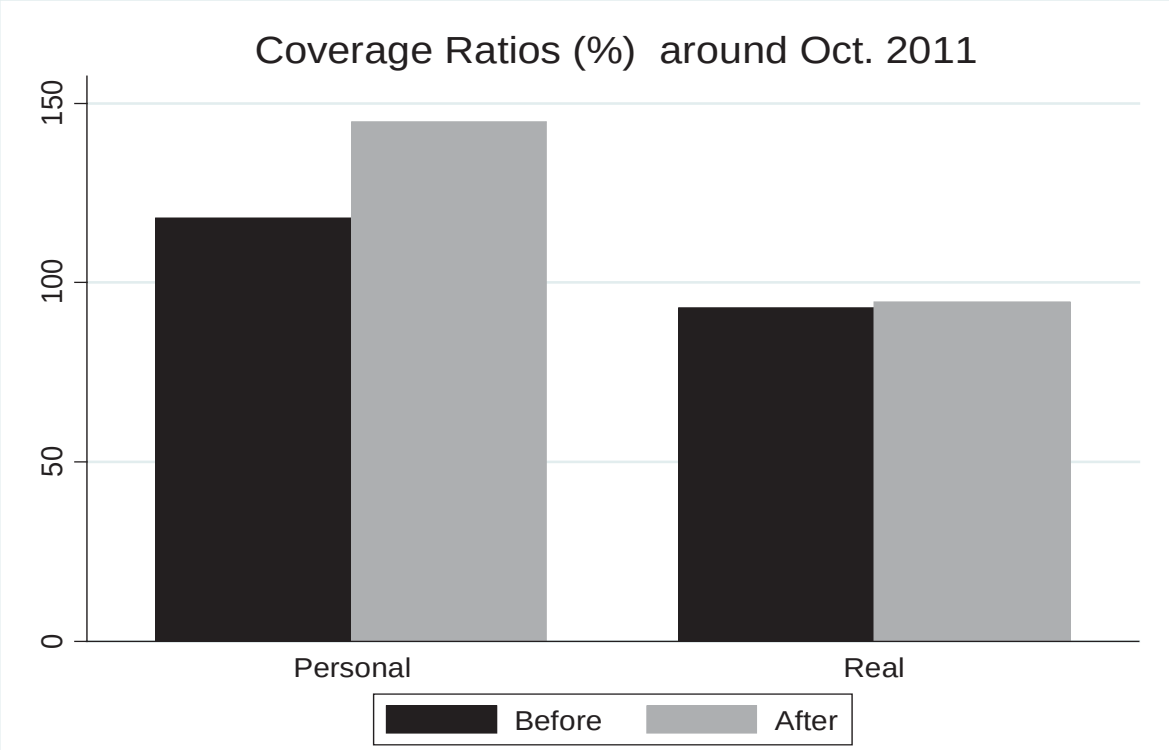
On the one hand, most loan agreements involving personal guarantees represent general claims against the present and future wealth and typically do not restrict the use of that wealth by the borrower, while real guarantees include restrictions on the use that borrowers can make of the assets pledged as a guarantee. Thus, personal guarantees generally represent a weaker pledge than real guarantees (Bodenhorn, 2003). In addition, the capital reduction based on real guarantees could be higher as most of the personal guarantees are not supported by official institutions that would minimize to a larger extent the consumption of capital (see Table 2, Panel B).

On the other hand, personal guarantees could act as a disciplining device that limits the borrower's risk preference incentives, surpassing that of business collateral (Mann, 1997). Moreover, personal guarantees are more valuable than real guarantees in case the guarantor's personal assets can be easily valuated or sold compared to certain firm-specific assets or human capital (Bodenhorn, 2003). In addition, borrowers that had prior loans with the bank may lack real estate or financial assets (real guarantees) to be pledged. Another reason supporting the use of personal guarantees relies on the potential advantages they offer to the bank in terms of efficiency. According to the information available for the period 2012-2014, most of the personal guarantees (more than 80 percent) are in the form of *póliza de afianzamiento mercantil*. This specific type of guarantee has a clear advantage over other types of guarantees: It can be rapidly and efficiently executed through extrajudicial enforcement. Finally, personal guarantees could also be of interest for banks to reduce their RWAs. To such aim, the creditworthiness of the guarantor should be sufficiently qualified to ensure the reimbursement of the principal and should provide a high enough coverage ratio. In this respect, Figure 3 shows an increase in the average coverage ratio of personal guarantees, supporting the idea that the bank could have increased the demand for those guarantees that can be

effectively used to reduce their RWAs. Indeed, from 2011 to 2012 the bank reduced the RWA applicable to most of the credit risk categories in the Advanced IRB corporate portfolio and, although to a lower extent, in the retail portfolio.

Figure 3: Coverage Ratio around October 2011

Figure 3 reports the average coverage ratio of new loans granted with personal or real guarantees using a 3-month window before and after October 2011.



Consistently with these arguments, Figure 2 reveals an important bank guarantee policy change in October 2011: After that date, guarantees are substantially more prevalent, especially in the form of personal guarantees.

Hypothesis 2: Both personal and real guarantees are used to improve loan's credit risk and regulatory capital requirements, but in our specific context personal guarantees are preferred to real guarantees.

We next turn to the effects of guarantees on firms' risk and profitability. A common result in the scarce literature analyzing the performance of firms engaging in secured loans following collateral granting is that collateralized loans exhibit higher default probabilities because borrowers that pledge collateral are riskier ex-ante (Jiménez and Saurina, 2004; and Berger et al., 2011). However, Berger et al. (2016), based on the Bolivian credit registry

for the period 1999–2003, show that the effect of collateral on ex-post performance could depend on the specific type of collateral. Thus, they find that illiquid collateral is consistently associated with higher ex-post non-performance, whereas the opposite occurs with liquid collateral, which supports the idea that liquid collateral has stronger risk-reducing incentives.[13] A similar positive effect associated to the use of guarantees is found by Ono et al. (2012) from a survey that consists of 500 Japanese SMEs covering the period 2001-2005. They document that those borrowers providing collateral experience larger increases in profitability and reductions in riskiness compared to borrowers that do not. This positive effect of collateral occurs through a cost-cutting restructuring channel. In addition, this paper represents the first attempt to examine how the provision of personal and real guarantees affects borrowers' ex-post performance and shows that the positive effect associated with guarantees is almost exclusively attributable to the real ones.

Our setting allows us to analyze in detail the risk and performance profiles of firms depending on the lender requirements of either personal or real guarantees. From a technical point of view, a personal guarantee leads to the transformation in the nature of the firm responsibility. In short, a limited responsibility firm becomes an unlimited responsibility firm if a loan is backed by personal guarantees. This could lead to a higher managerial effort level to avoid losing their pledged personal wealth in case of default. For this reason, personal guarantees should in principle reduce the risk-appetite to a larger extent. In fact the stronger disciplinary effect of personal guarantees in the form of higher effort and lower risk taking incentives, as stated by Mann (1997), could lead in the end to a better firm performance.

However, the overuse of guarantees, as documented after October 2011 concerning personal guarantees, could limit their effectiveness. For this reason, the requirement to pledge this type of guarantees solely based on

[13] Liquid collateral is the one pledged in the form deposits, bank guarantees, or securities while illiquid collateral corresponds to the remaining types of collateral.

capital relief purposes and not to discipline borrowers limiting their risk taking could have a negligible effect on their later default risk. After the extensive use of this type of guarantees and the substantial increase in their coverage ratio, the borrower's incentives to take any risk could be so low that it could discourage firms to undertake certain investments, affecting the efficiency of their investment decisions. This would lead to a negative effect on firm performance and, as a consequence, on the real economy.

Hypothesis 3: Personal guarantees are more effective than real guarantees to mitigate the firms' risk but their overuse could limit its effectiveness and damage firm performance.

4. Drivers of Real and Personal Guarantees

In this section, we first lay out the empirical model we analyze, together with the first empirical results. We explain here the role of each different driver on the usage of personal guarantees and real collateral.

4.1. Empirical Framework

We postulate the following ordinary least squares regression framework,[14] where the existence/absence of personal or real guarantees (1/0) in a given loan contract i, denoted as G_i, is regressed on several sets of variables, including information on the bank, loan, bank-firm and firm characteristics, plus sector, bank/subsidiaries,[15] year, and province fixed effects:

$$G_i = \alpha + \beta_1 B_b + \beta_2 L_i + \beta_3 BF_{b,f,t} + \beta_4 F_{f,t} + \theta_s + \mu_b + \gamma_y + \delta_p + \varepsilon_i \quad (1)$$

where B_b, L_i, $BF_{b,f.t}$ and $F_{f,t}$ stand for the bank, loan, bank-firm and firm characteristics described in Section 2, respectively. Both bank-firm and firm

[14] Although the results obtained with a logistic model are similar to the ones obtained with the OLS regression, we opt for the last one because the probabilities that we are modelling are not extreme. Under these circumstances, both models fit equally well but the linear model is preferred for its ease of interpretation.

[15] The use of subsidiary fixed effects enables us to deal with different organizational structures, or business models of each subsidiary.

characteristics refer to the month before the loan is granted (t). The subscript b denotes the bank/subsidiary granting the loan to firm f operating in sector s and located in province p. The subscript y denotes the year in which the loan is granted and so, the term γ_y refers to the use of year fixed effects. Standard errors are clustered at the firm level.

4.2. Results

Table 4 provides evidence on the effects of bank, loan, bank-firm and firm characteristics on the use of personal and real guarantees. The first two columns show results when personal guarantees are the dependent variable (1/0), whereas columns 4 to 5 contain results for real guarantees. Columns 1 and 4 exclude the loan characteristics, as they could potentially be jointly determined with the use of guarantees (and hence would therefore be "bad" controls).[16] However, results confirm that their inclusion does not change the results. For this reason, we include loan characteristics in the remaining specifications. Columns 3 and 6 report the economic impact of each variable on the use of personal and real guarantees, respectively. The economic impact is obtained as the product of one standard deviation in the corresponding explanatory variable times its estimated coefficient relative to the unconditional mean of the dependent variable.

[16] Brick and Palia (2007) and other authors propose a simultaneous determination between collateral and loan interest rates. Recently, Mosk (2014) has shown that collateral decisions are prior to both interest and non-interest rate decisions in loan contracts. Our study also controls for variables such as borrower risk and loan characteristics that are important in setting interest rates.

Table 4: Determinants of the use of personal and real guarantees

This table provides evidence on the effect of bank, loan, bank-firm and firm characteristics on the use of personal and real guarantees. The dependent variable in columns (1)-(2) is a variable that equals 1 if the loan has a personal guarantee and 0 otherwise. In columns (4)-(5) the dependent variable is a dummy that equals 1 if the loan has real guarantee and 0 otherwise. Columns (1) and (3) report the results obtained from the estimation of equation (1) without loan characteristics while columns (2) and (5) contain the results obtained from the full specification and represent the baseline specifications. Finally, columns (3) and (6) report the economic impact of the baseline specification in percentage points, which is obtained as the product of one standard deviation in the corresponding explanatory variable times its estimated coefficient relative to the unconditional mean of the dependent variable. All regressions include sector, bank, year and province fixed effects. The standard errors are clustered at firm level and given in parentheses. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Personal Guarantees (0/1)	(2) Personal Guarantees (0/1)	(3) Econ. Imp / Mean (%)	(4) Real Guarantees (0/1)	(5) Real Guarantees (0/1)	(6) Econ. Imp / Mean (%)
Firm Characteristics						
Total Assets (log eur)	-0.060***	-0.057***	-19.425	0.000	0.001	0.753
	[0.004]	[0.005]		[0.001]	[0.001]	
Leverage	0.001***	0.001***	4.189	0.000***	0.000***	8.030
	[0.000]	[0.000]		[0.000]	[0.000]	
ROA (%)	0.000	0.000	0.358	-0.001***	-0.001***	-8.363
	[0.000]	[0.000]		[0.000]	[0.000]	
Refinancing (0/1)	0.056***	0.055***	6.609	0.069***	0.069***	36.317
	[0.012]	[0.012]		[0.004]	[0.004]	
Bank-Firm Characteristic						
Any Other Type of Contract (0/1)	-0.034***	-0.008	-1.072	-0.040***	-0.001	-0.594
	[0.006]	[0.006]		[0.003]	[0.003]	
Bank Characteristic						
Branch-Headquarter Distance (log km)	0.009***	0.007**	3.086	0.009***	0.005***	11.000
	[0.003]	[0.003]		[0.001]	[0.001]	
Loan Characteristics						
Loan Maturity (log months)		0.058***	18.911		0.077***	110.024
		[0.002]			[0.001]	
Loan Size (log)		0.008*	3.614		0.022***	42.214
		[0.005]			[0.001]	
Sector FE	YES	YES		YES	YES	
Bank FE	YES	YES		YES	YES	
Year FE	YES	YES		YES	YES	
Province FE	YES	YES		YES	YES	
Observations	477,208	477,208		477,208	477,208	
R-squared	0.319	0.336		0.154	0.265	

Table 4 shows that the coefficients on loan maturity are positive and significant for both personal and real guarantees. However, it is larger in statistical and, especially, in economic terms in the case of real collateral, supporting the idea that as loans become longer-term, e.g., mortgages, the bank relies more on tangible real assets than in more uncertain personal guarantees. We also document that the effect of the loan size on the likelihood of posting guarantees is statistically significant at 5% level only

in the case of real guarantees. Thus, in the presence of large loans, the bank prefers to request real collateral to seize the real assets in case of default. Similar conclusions can be obtained from Table 5, which has a structure analogous to Table 4 but relies on the coverage ratio (guarantee value

Table 5: Determinants of the coverage of personal and real guarantees

This table provides evidence on the effect of bank, loan, bank-firm and firm characteristics on the coverage ratio of real and personal guarantees. The dependent variable in columns (1)-(2) is the coverage of personal guarantees, relative to the loan size. In columns (4)-(5) the dependent variable is the coverage of real guarantees, relative to the loan size. Columns (1) and (3) report the results obtained from the estimation of equation (1) without loan characteristics while columns (2) and (5) contain the results obtained from the full specification and represent the baseline specifications. Finally, columns (3) and (6) report the economic impact of the baseline specification in percentage points, which is obtained as the product of one standard deviation in the corresponding explanatory variable times its estimated coefficient relative to the unconditional mean of the dependent variable. All regressions include sector, bank, year and province fixed effects. The standard errors are clustered at firm level and given in parentheses. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Personal Guarantees Coverage	Personal Guarantees Coverage	Econ. Imp / Mean (%)	Real Guarantees Coverage	Real Guarantees Coverage	Econ. Imp / Mean (%)
VARIABLES	(%)	(%)		(%)	(%)	
Firm Characteristics						
Total Assets (log eur)	-10.084***	-9.609***	-20.358	0.083	0.221**	3.390
	[0.625]	[0.755]		[0.126]	[0.113]	
Leverage	0.082***	0.082***	3.457	0.025***	0.026***	7.918
	[0.019]	[0.019]		[0.006]	[0.005]	
ROA (%)	0.073	0.076	1.083	-0.086***	-0.079***	-8.202
	[0.058]	[0.058]		[0.019]	[0.018]	
Refinancing (0/1)	11.365***	11.212***	8.314	6.985***	6.999***	37.588
	[2.191]	[2.152]		[0.451]	[0.398]	
Bank-Firm Characteristic						
Any Other Type of Contract (0/1)	0.780	1.375	1.190	-3.879***	-0.158	-0.990
	[1.316]	[1.318]		[0.324]	[0.312]	
Bank Characteristic						
Branch-Headquarter Distance (log km)	1.156**	1.079*	3.162	0.835***	0.497***	10.559
	[0.573]	[0.575]		[0.155]	[0.129]	
Loan Characteristics						
Loan Maturity (log months)		2.104***	4.235		7.662***	111.698
		[0.436]			[0.125]	
Loan Size (log)		-0.770	-2.120		1.840***	36.696
		[0.642]			[0.108]	
Sector FE	YES	YES		YES	YES	
Bank FE	YES	YES		YES	YES	
Year FE	YES	YES		YES	YES	
Province FE	YES	YES		YES	YES	
Observations	477,208	477,208		477,208	477,208	
R-squared	0.336	0.337		0.150	0.254	

divided by loan size) instead of the use (or not) of a particular type of guarantee.[17]

The moral hazard literature documents that when lenders can observe a borrower's credit quality, low/high quality borrowers obtain loans with/without collateral (Boot, Thakor, and Udell, 1991; Berger and Udell, 1990 and 1995; and Jiménez, Salas, and Saurina, 2006). In line with this theory, we document in Tables 4 and 5 that overall, firm characteristics suggesting higher creditworthiness imply lower guarantees requirements. There are two exceptions, as higher firm size only impacts on personal guarantees, whereas higher profitability only reduces real guarantees.

Table 5 shows one difference with respect to the impact of firm related variables on coverage ratios, since different signs are obtained for the effect of total assets across types of guarantees: It is negative for personal guarantees, whereas it is positive for real guarantees. This implies that in the case of personal guarantees, the bank tends to require higher coverage ratios to small firms. In contrast, in terms of real guarantees, smaller firms are required lower coverage ratios. This is consistent with the results in Ang, Lin and Tyler (1995), who find that small business owners often pledge personal assets and wealth in business loans.

Another dimension determining the use of guarantees is relationship lending. The existence of a bank-firm relationship would in principle imply less asymmetric information and hence, less collateral (see theoretical studies by Boot and Thakor, 1994, and empirical work by Berger and Udell, 1995, Degryse and Van Cayseele, 2000, and Bharath, Dahiya, Saunders, Srinivasan, 2011, among others). When the loan information is not included in the regression (i.e., columns 1 and 4 of Table 4), we document a negative and significant effect of our relationship lending proxy, which is the existence of other bank-firm contracts, for both types of guarantees.

[17] The coefficients in columns (4) and (5) of Table 5 are around a hundred times higher than those of columns (4) and (5) of Table 4, which rely on the discrete dependent variable. This indicates that the real guarantees in the form of mortgages cover, on average, around 100 percent of the loan size as it is shown in Panel B of Table 2.

However, when loan characteristics are included, the effect of relation lending turns out to be non-significant in both cases. Similar results are obtained in Table 5.

Tables 4 and 5 unambiguously show that a higher organizational distance increases the likelihood of pledging both personal and real guarantees.[18] This finding is line with Meles, Sampagnaro and Starita (2013), who document that distant branches – those with more difficulties to obtain soft information and site-specific information from headquarters – are more likely to require collateral than local ones. However, these results do not support the lender-based view of Inderst and Mueller (2007). According to this perspective, local banks (i.e., banks with short organizational distance) attract local borrowers. Local banks have superior information but they cannot use this information to set local borrower loan's interest rates because of competition constraint and the existence of an outside option (i.e., the borrower can go to a distant lender). To overcome these constraints, local banks require collateral to exploit their informational advantages. In addition, our results also challenge Berger and Udell (2002), who argue that the larger the organizational distance, the more likely the loan is processed using transactional lending technologies. According to their view, transactional lending implies that loans are granted to safe and highly transparent borrowers, which are less likely to be collateralized. In contrast, our findings support the idea that the organizational distance favors the use of collateral.

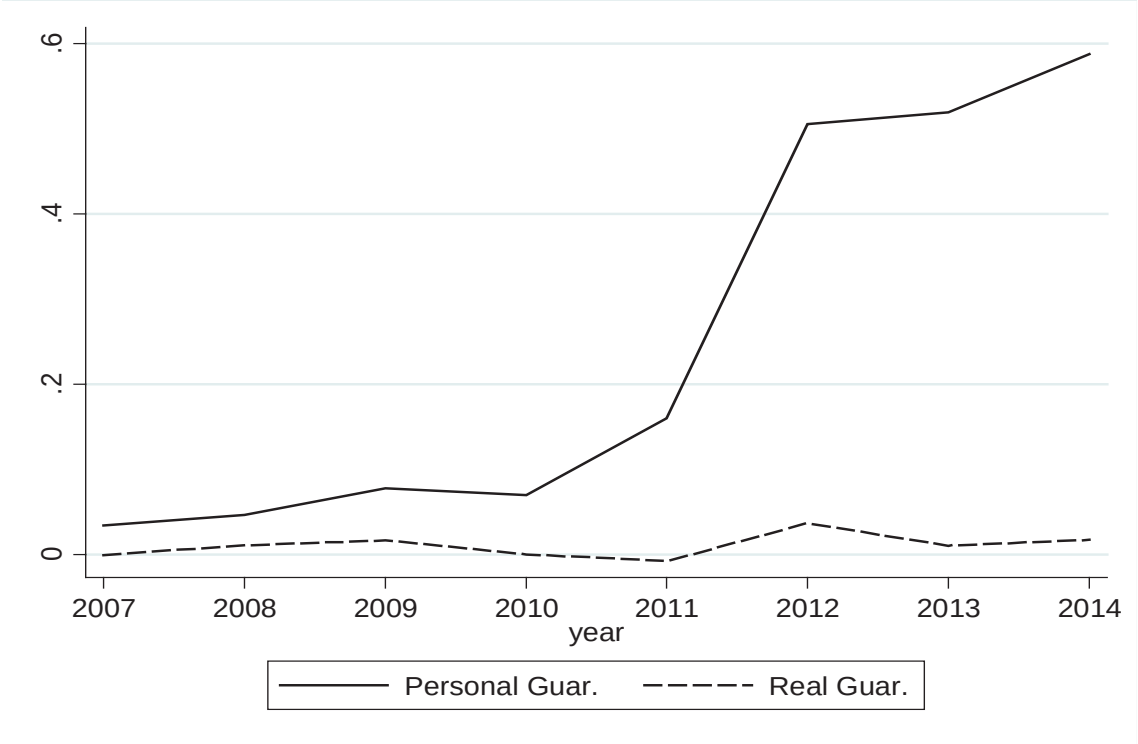
Although not reported in Tables 4 and 5, the magnitude of the year fixed-effects coefficients can help us understand the use of personal and real guarantees over the sample period. These coefficients reflect the effects of economic variables that are common to all the firms and loans granted over the sample period. Figure 4 depicts the coefficients for the year effects estimated from equation (1) using as dependent variables dummies that denote the existence of personal and real guarantees in a given loan. We

[18] Similar results are obtained using minutes instead of kilometers to measure the distance.

observe that there is a sharp increase in the magnitude of the coefficients corresponding to the personal guarantees after 2011. This effect could be due to the Spanish economic and financial crisis, but also to the requirements of European banks to improve the capital ratio – we further elaborate on this point in the next section.[19]

Figure 4: Year fixed effects

Figure 4 shows the year fixed effects estimated from equation (1) using as dependent variables dummy variables that denotes the existence of personal (solid line) and real (dashed line) guarantees in a given loan.



As a formal test of Hypothesis 1, we examine the differential effects of each explanatory variable on the use and coverage of both personal and real guarantees. For that aim, we first fit two different models separately on the same data, one based on personal guarantees and the other on real

[19] Around 13,500 loans in our sample include both personal and real guarantees. We examine in the Internet Appendix whether this duplicity of guarantees affect to our results. We find that the results are basically unchanged when we account for the use of both types of guarantees. In addition we observe that when the loan has a personal (real) guarantee there is a significantly lower probability of additionally having a real (personal) guarantee. Thus, although some loans have the two types of guarantees, they are really substitutes.

guarantees. We store the estimation results and we then estimate the simultaneous covariance of the coefficients (i.e., cross-model covariances) to test the cross-coefficients hypothesis that the common coefficients are equal. If this is the case, they would exhibit similar effects on personal and real guarantees. Columns (1) and (2) in Table 6 show the results of these tests.

Table 6 reveals significant differential effects of loan maturity, confirming that real collateral is increasingly prevalent at longer maturities. The loan size and total assets tests are negative and significant, confirming that the bank prefers to require real instead of personal guarantees to large firms and for large loans. This may reveal larger uncertainty about the firm's owners/managers ability to pay back the loan when this is large. Table 6 also shows that personal guarantees are more frequently used in more leveraged firms, suggesting that the bank tends to use personal guarantees as the firm creditworthiness worsens.

Table 7 shows the percentage of the R-squared explained by each group of variables associated with results reported in Table 4 (first and second columns) and Table 5 (third and fourth columns). The first (second) and third (fourth) columns refer to the explanatory power of each group of drivers on personal (real) guarantees and their coverage ratio, respectively.

The most important group of variables explaining personal guarantees are the year fixed-effects (63.46 and 80.75 percent, for guarantee dummies and coverage ratios, respectively), that proxy for overall economic conditions. Relevant second order effects are firm and loan characteristics, together with the bank dummies. The results are very different for real guarantees. In this case, loan characteristics exhibit a crucial role (58.14 and 57.11 percent, for guarantee dummies and coverage ratios, respectively), followed by the sector dummies (23.60 and 23.98 percent, respectively). In particular, the construction sector is the one where the use of real guarantees is preferred to a higher extent. The prevalent role of loan characteristics for the use of real guarantees is due to the fact that most of the long-maturity / large-size loans require real guarantees.

Table 6: Differential effects of the determinants of the use and coverage of personal and real guarantees

This table provides evidence on the differential effects of several groups of variables on the use and coverage of personal and real guarantees. To analyze the differential effects of the variables we first fit two different models separately on the same data, one based on personal and the other on real guarantees. We store the estimation results and then, we estimate the simultaneous covariance of the coefficients of the two previous models (i.e., cross-model covariances) to test the cross-coefficients hypothesis that the common coefficients are equal and so, exhibit similar effects on personal and real guarantees. Thus, our aim is to compare the differential effects of different drivers of the use and coverage of guarantees on the two types of guarantees. As the two estimations rely on the same estimation sample, the standard errors obtained from the simultaneous estimation are identical to those obtained for each individual regression. Column (1) contains the results of tests for cross-model hypotheses based on linear combinations of cross-model coefficients obtained when the use of personal and real guarantees are regressed on the same explanatory variables. The results contained in column (2) correspond to the case in which we use the coverage ratio of personal and real guarantees. The standard errors are clustered at firm level and given in parentheses. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

	(1) Guarantees (0/1)	(2) Coverage
	b[Personal] - b[Real]	b[Personal] - b[Real]
VARIABLES		
Firm Characteristics		
Total Assets (log eur)	-0.057***	-9.83***
	[0.005]	[0.758]
Leverage	0.000**	0.056***
	[0.000]	[0.020]
ROA (%)	0.001***	0.155***
	[0.000]	[0.056]
Refinancing (0/1)	-0.014	4.214*
	[0.013]	[2.215]
Bank-Firm Characteristic		
Any Other Type of Contract (0/1)	-0.007	1.533
	[0.007]	[1.363]
Bank Characteristic		
Branch-Headquarter Distance (log km)	0.001	0.582
	[0.003]	[0.581]
Loan Characteristics		
Loan Maturity (log months)	-0.019***	-5.558***
	[0.003]	[0.471]
Loan Size (log)	-0.014***	-2.609***
	[0.004]	[0.636]
Sector FE	YES	YES
Bank FE	YES	YES
Year FE	YES	YES
Province FE	YES	YES

Table 7: Percentage of R-squared explained by each group of variables

This table contains the percentage of the R-squared explained by each group of variables employed in the regressions whose results are reported in Tables 4 and 5. Concretely, column (1) represents the percentage of the R-squared explained by bank, loan, bank-firm and firm characteristics, and sector, bank, year and province dummy variables according to the results obtained in column (2) of Table 4. Column (2) corresponds to the R-squared obtained in column (5) of Table 4. Finally, columns (3) and (4) correspond to the R-squared obtained in columns (2) and (5) of Table 5, respectively.

	(1) Personal Guarantees (0/1)	(2) Real Guarantees (0/1)	(3) Personal Guarantees Coverage (%)	(4) Real Guarantees Coverage (%)
Firm Characteristics				
Total Assets (log eur)				
Leverage	7.58	6.52	5.46	6.96
ROA (%)				
Refinancing (0/1)				
Bank-Firm Characteristic				
Any Other Type of Contract (0/1)	3.86	2.95	2.53	2.90
Bank Characteristic				
Branch-Headquarter Distance (log km)	0.06	0.23	0.05	0.22
Loan Characteristics				
Loan Maturity (log months)	8.30	58.14	0.85	57.11
Loan Size (log)				
Sectoral Dummies	2.78	23.60	0.70	23.98
Bank Dummies	9.35	1.35	6.57	1.30
Year Dummies	63.46	1.32	80.75	1.44
Province Dummies	4.60	5.89	3.10	6.09

In sum, our results support Hypothesis 1 due to the significant differential effects of loan characteristics (size and maturity), the firm credit quality, and economic conditions on real and personal guarantee usage. Given the contrasting effect attributable to economic conditions and the extensive use of personal guarantees after 2011 (see Figure 1), we investigate in Section 5 the bank guarantee policy change that occurred in the last quarter of 2011. In turn, Section 6 analyzes the effects of guarantees on firm risk and performance for the period before and after the personal guarantees became widely required.

5. Use of Real and Personal Guarantees around October 2011

Figure 2 reveals a notorious change of strategy with regard to the requirements of guarantees in October 2011. This is the outcome of a

combination of two events: i) the recommendations and measures following the July 2011 stress test results in an environment of weak economic conditions; and ii) the EU agreement for which European banks should increase their capital buffers.

We next analyze in detail the implications of this new strategy on the usage of guarantees following October 2011. Given the needs for capital and the improvement of loan portfolios' credit risk, banks would tend to require more guarantees in loan contracts in order to hedge against potential losses derived by loan defaults and to align the interest of creditors and debtors mitigating default rates. Indeed, efficient personal guarantees (i.e., personal guarantees that satisfy certain conditions) and real guarantees can be used to reduce RWA, and thus, to improve regulatory capital requirements. To further understand this shift in the bank policy concerning guarantees, we perform the following experiment. We estimate equation (1) using a 3-month window before and after the October 2011 on the same set of explanatory variables with the exception of the year fixed effects.[20] In addition, we add to the specification a proxy for the overall economic risk, as measured by the 5-year sovereign CDS spread. We include a dummy called policy change that takes the value one after October 2011, and equals zero otherwise. Results are shown in Table 8, with the use of guarantees and coverage ratios as dependent variables. The table also shows the differences across coefficients (personal v/s real guarantees) and a test in which the null hypothesis states that both coefficients are the same.

[20] We have repeated the estimation of equation (1) for the pre-October 2011 period to discard that the results in Table 4 are driven by the policy event. We find that these new results are consistent with those reported in Table 4.

Table 8: Bank guantee policy change

This table analyzes how banks modify their guarantee policy in order to improve their loan's credit risk and capital ratios around October 2011. We estimate equation (1) using a 3-month window before and after the bank policy change on the same set of explanatory variables as in equation (1) with the exception of the year fixed effects. Additionally, we add to the specification a proxy for risk of the whole economy measured from the 5-year sovereign CDS spread. We include a dummy called policy change that equals 1 after October, 2011, and equals 0 otherwise. Columns (1) and (2) report the results obtained when the dependent variables are the use of personal and real guarantees, respectively. Columns (4) and (5) contain the results obtained when the dependent variables are the coverage of personal and real guarantees relative to the loan size, respectively. Columns (3) and (6) contain the difference of common coefficients obtained in columns (1)-(2) and (4)-(5), respectively, and a test in which the null hypothesis states that both coefficients have similar effects on the corresponding dependent variables based on the same methodology used in Table 6. The standard errors are clustered at firm level and given in parentheses. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Personal Guarantees (0/1)	(2) Real Guarantees (0/1)	(3) b[Personal] - b[Real] Guarantees (0/1)	(4) Personal Guarantees Coverage (%)	(5) Real Guarantees Coverage (%)	(6) b[Personal] - b[Real] Coverage
Bank Guarantee Policy Change						
Policy Change (0/1)	0.429***	0.033***	0.396***	66.892***	3.269***	63.623***
	[0.013]	[0.005]	[0.014]	[2.127]	[0.519]	[2.173]
Firm Characteristics						
Total Assets (log eur)	-0.061***	0.001	-0.062***	-9.393***	0.294	-9.686***
	[0.007]	[0.002]	[0.007]	[1.009]	[0.238]	[1.033]
Leverage	0.000**	0.000	0.000	0.080**	0.012	0.068***
	[0.000]	[0.000]	[0.000]	[0.038]	[0.009]	[0.039]
ROA (%)	0.000	-0.001***	0.001**	0.172*	-0.071***	0.243**
	[0.001]	[0.000]	[0.001]	[0.102]	[0.027]	[0.104]
Refinancing (0/1)	0.034***	0.056***	-0.021	2.673	5.694***	-3.020
	[0.012]	[0.006]	[0.014]	[1.933]	[0.631]	[2.075]
Bank-Firm Characteristic						
Any Other Type of Contract (0/1)	-0.002	-0.011*	0.009	-3.598*	-1.104	-2.494
	[0.012]	[0.007]	[0.014]	[2.025]	[0.673]	[2.159]
Bank Characteristic						
Branch-Headquarter Distance (log km)	0.011**	0.009***	0.002	1.080	0.775***	0.304
	[0.005]	[0.002]	[0.006]	[0.917]	[0.231]	[0.928]
Loan Characteristics						
Loan Maturity (log months)	0.060***	0.075***	-0.015**	2.585***	7.345***	-4.760***
	[0.005]	[0.003]	[0.006]	[0.812]	[0.328]	[0.901]
Loan Size (log)	0.003	0.016***	-0.013**	-0.880	1.263***	-2.143***
	[0.005]	[0.002]	[0.005]	[0.729]	[0.207]	[0.747]
Sovereign Risk						
Sovereign CDS	0.000	-0.000	0.000	0.017	-0.004	0.022
	[0.000]	[0.000]	[0.000]	[0.020]	[0.004]	[0.021]
Sector FE	YES	YES		YES	YES	
Bank FE	YES	YES		YES	YES	
Province FE	YES	YES		YES	YES	
Observations	28,994	28,994		28,994	28,994	
R-squared	0.341	0.232		0.273	0.214	

Columns (1) and (2) in Table 8 show that the use of personal and real guarantees is significantly more widespread after the bank guarantee policy change, with personal guarantees increasing substantially more (column

(3)). This is also the case for coverage ratios, as shown in columns (4) to (6). The control variables produce the same qualitative results as those in Tables 4 and 5 except that the loan size for personal guarantees and leverage for real guarantees are no longer significant.

In Table 9 we show the percentage of R-squared explained by each set of variables in the regressions shown in Table 8. Half of the variation in both the use and coverage ratio of personal guarantees is explained by the policy change. Bank dummies explain around 20 percent, firm characteristics explain around 8 percent and the CDS spread explains almost 8 percent. Results for real guarantees stand in stark contrast, as the policy change only explains around 3 percent. Again, loan characteristics explain most of the variations in real guarantees and the associated coverage ratios (more than 54 percent), with the sectorial dummies explaining around 20 percent and the province dummies more than 9 percent.

Table 9: Percentage of R-squared explained by each group of variables around the bank guantee policy change

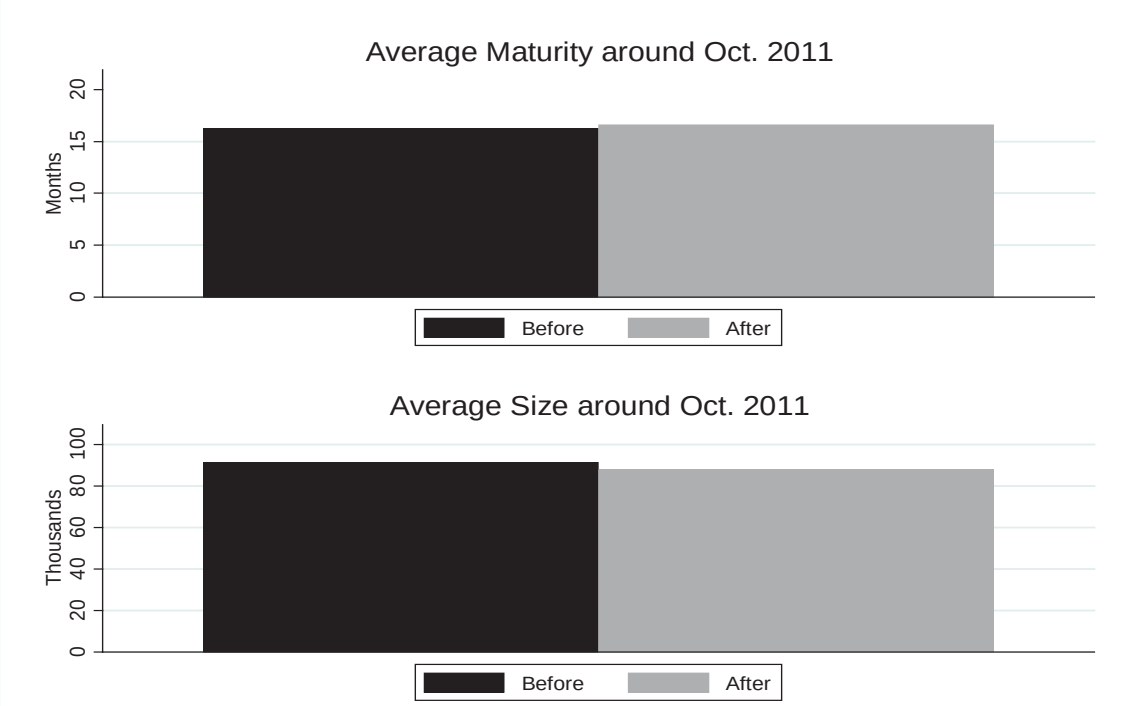
This table contains the percentage of the R-squared explained by each group of variables employed in the regressions whose results are reported in Table 8. Concretely, column (1) represents the percentage of the R-squared explained by the bank policy change, distance, loan characteristics, relationship lending, firm characteristics, sovereign risk, and industry, bank, year and province dummies variables according to the results obtained in column (1) of Table 8. Column (2) corresponds to the R-squared obtained in column (2) of Table 8. Finally, columns (3) and (4) correspond to the R-squared obtained in columns (4) and 5 of Table 8, respectively.

	(1) Personal Guarantees (0/1)	(2) Real Guarantees (0/1)	(3) Personal Guarantees Coverage (%)	(4) Real Guarantees Coverage (%)
Bank Guarantee Policy Change				
Policy Change	50.97	3.14	53.35	3.22
Firm Characteristics				
Total Assets (log eur) Leverage (%) ROA (%) Refinancing (0/1)	7.66	5.87	7.90	6.29
Bank-Firm Characteristic				
Any Other Type of Contract (0/1)	0.80	3.18	0.94	3.31
Bank Characteristic				
Branch-Headquarter Distance (log km)	0.29	0.33	0.27	0.28
Loan Characteristics				
Loan Maturity (log months) Loan Size (log)	4.50	54.57	1.08	54.52
Sovereign Risk				
Sovereign CDS	7.87	0.48	7.83	0.36
Sectoral Dummies	2.28	20.39	2.92	19.28
Bank Dummies	21.66	2.81	20.47	2.75
Province Dummies	3.99	9.23	5.23	9.98

Our results are in agreement with Hypothesis 2 and speak clearly about the change in the strategy of guarantees requirements to help improve the loan's credit risk and regulatory capital requirements. The bank reacted by increasing both types of guarantees but the use of personal guarantees became substantially more prevalent. Indeed, Figure 5 shows that the shift towards personal guarantees did not come from a change in the average maturity or in the average loan size given that they were comparable in those terms. Despite the potential limitations of personal guarantees to reduce RWA (i.e., personal guarantees should satisfy strict requirements to

Figure 5: Maturity and size around October 2011

The top panel shows the average loan maturity using a 3-month window before and after October 2011. The bottom panel shows the average loan size using a 3-month window before and after October 2011.



be considered effective and consequently not necessarily all personal guarantees can be used to reduce RWA), the more rapid and efficient collateral execution of the personal guarantees jointly with higher coverage ratios and the lack of real assets to be used as collateral; could justify their extended use.

One may argue that if the bank uses guarantees to improve its regulatory capital, better capitalized subsidiaries should require guarantees less frequently. We take advantage of the information relative to the specific subsidiary granting the loan to conduct a formal test on this issue. For that aim, we perform a regression analysis similar to the one whose results are reported in Table 8 but including a dummy that is equal to one if the total capital ratio on unconsolidated basis is above the median across the bank and its subsidiaries, and its interaction with the policy change dummy.[21]

[21] The bank/subsidiary fixed effects used in the baseline regression are excluded from this specification

Results, reported in Table 10, show that the better is the capital position of the credit institution, the lower is the use of both real and personal guarantees. The lower use of guarantees by better capitalized subsidiaries is even more evident in the case of personal guarantees after October 2011, confirming the idea that the policy change affected those subsidiaries with lower capital ratios. The linear combination of the coefficients associated to the dummy denoting the policy change and its interaction with the dummy that is equal to one for better capitalized subsidiaries, is positive and statistically significant. Thus, the use of personal guarantees after the policy change was common to all the subsidiaries but those with worse capital ratios required this type of guarantees to a much higher extent. The goal of worse capitalized subsidiaries to improve capital ratios through an extensive use of efficient personal guarantees is supported by Figure 3, which shows an increase in the average coverage ratio of personal guarantees after the guarantee policy change.

One potential concern one may have about these findings is the presence of potentially confounding events. Indeed on October 26, 2011, the ECB allotted 56,934 millions of Euros to the banking system through its 1-year LTRO facility. This operation was announced on October 6, 2011 joint with another operation for December 21, 2011 that was finally substituted by the 3-year LTRO. This timing coincides with our previously analyzed policy change and given that the LTRO could have influenced the supply of loans and their characteristics, we need to show that the increase in the use of guarantees is not due to the implementation of this non-standard measure.

We do so by relying on the first implementation of the LTRO facility in 2009. Concretely, on May 2009, the ECB announced three 1-year LTRO facilities that would come into effect on June 24, September 30, and December 15, 2009. To discard the possibility that previous results are influenced by the implementation of the LTRO facility, we analyze if there is a significant variation in the bank guarantee policy around the first announcement of the LTRO in 2009. The results, available in the Internet Appendix, show that the probability of requiring personal guarantees

Table 10: Bank guantee policy change and regulatory capital needs

This table analyzes how banks modify their guarantee policy in order to improve their loan's credit risk and capital ratios around October 2011 depending on their capital position. The novelty with respect to Table 8 is the use of the dummy variable "Total Capital Ratio Above Median" and its interaction with the variable "Policy Shock" as two additional explanatory variables. "Total Capital Ratio Above Median" is equal to one if the total capital ratio on unconsolidated basis is above the median across the bank and its subsidiaries and zero otherwise. Columns (1) and (2) report the results obtained when the dependent variables are the use of personal and real guarantees, respectively. Columns (4) and (5) contain the results obtained when the dependent variables are the coverage of personal and real guarantees relative to the loan size, respectively. Columns (3) and (6) contain the difference of common coefficients obtained in columns (1)-(2) and (4)-(5), respectively, and a test in which the null hypothesis states that both coefficients have similar effects on the corresponding dependent variables based on the same methodology used in Table 6. The standard errors are clustered at firm level and given in parentheses. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Personal Guarantees (0/1)	(2) Real Guarantees (0/1)	(3) b[Personal] - b[Real] Guarantees (0/1)	(4) Personal Guarantees Coverage (%)	(5) Real Guarantees Coverage (%)	(6) b[Personal] - b[Real] Coverage
Bank Policy Change						
Policy Change (0/1)	0.472***	0.032***	0.441***	74.185***	3.149***	71.036***
	[0.013]	[0.006]	[0.014]	[2.193]	[0.583]	[2.263]
Total Capital Ratio Above Median (0/1)	-0.069***	-0.034***	-0.035***	-6.449***	-3.264***	-3.184
	[0.013]	[0.006]	[-0.035]	[1.864]	[0.570]	[-3.184]
Total Capital Ratio Above Median x Policy Change (0/1)	-0.402***	0.002	-0.404***	-65.276***	0.229	-65.506***
	[0.022]	[0.009]	[0.024]	[3.600]	[0.933]	[3.746]
Firm Characteristics						
Total Assets (log eur)	-0.067***	0.001	-0.068***	-10.237***	0.297	-10.534***
	[0.006]	[0.002]	[0.007]	[0.954]	[0.235]	[0.986]
Leverage	0.000*	0.000	0.000	0.075*	0.011	0.064
	[0.000]	[0.000]	[0.000]	[0.039]	[0.009]	[0.041]
ROA (%)	0.001	-0.001***	0.001**	0.192*	-0.070**	0.263**
	[0.001]	[0.000]	[0.001]	[0.103]	[0.027]	[0.105]
Refinancing (0/1)	0.032**	0.055***	-0.024	2.289	5.628***	-3.338
	[0.012]	[0.006]	[0.014]	[1.962]	[0.633]	[2.095]
Bank-Firm Characteristic						
Any Other Type of Contract (0/1)	0.000	-0.010	0.010	-3.290	-1.047	-2.244
	[0.012]	[0.006]	[0.014]	[2.045]	[0.671]	[2.172]
Bank Characteristic						
Branch-Headquarter Distance (log km)	-0.008	0.008***	-0.016***	-1.640*	0.665***	-2.305**
	[0.005]	[0.002]	[0.006]	[0.875]	[0.225]	[0.905]
Loan Characteristics						
Loan Maturity (log months)	0.058***	0.074***	-0.016**	2.309***	7.259***	-4.950***
	[0.005]	[0.003]	[0.006]	[0.782]	[0.323]	[0.873]
Loan Size (log)	0.004	0.016***	-0.012**	-0.735	1.251***	-1.986***
	[0.004]	[0.002]	[0.005]	[0.702]	[0.206]	[0.725]
Sovereign Risk						
Sovereign CDS	0.000	-0.000	0.000	0.006	-0.005	0.010
	[0.000]	[0.000]	[0.000]	[0.020]	[0.004]	[0.021]
Sector FE	YES	YES		YES	YES	
Bank FE	NO	NO		NO	NO	
Province FE	YES	YES		YES	YES	
Observations	28,994	28,994		28,994	28,994	
R-squared	0.335	0.231		0.273	0.213	

actually diminishes after the announcement of the 1-year LTRO. It confirms that the results obtained in the previous analysis cannot be attributed to the coincident announcement of the LTRO facility.

6. The Use of Guarantees and Firm Risk Taking

In this section we analyze whether guarantees contribute to discipline borrowers leading to lower default rates thereby enhancing firm profitability.

6.1. Empirical methodology

Firm risk is measured by means of a dummy variable that takes the value of one in case a firm's loan defaults a year after the first time the firm pledged guarantees, conditioned on not having defaulted prior to that event. We require guarantees to cover every single day during the three years following the guarantee pledge. Otherwise, we drop these loans/firms from our analysis.

Those individual firms that pledged guarantees for the first time in a given loan contract (treatment group) are then matched to a control group. This group consists of firms in the same industry, with similar size and profitability that got the loan the same year as the corresponding firm in the treatment group but did not pledge guarantees after the granting of the loan and did not pledge guarantees in the prior three years. We form buckets along the year, size, profitability, and industry dimensions in order match firms according to these variables. We consider three size buckets following the European Commission classification.[22] The three size buckets include micro and small firms (less than €10 million of total assets), medium-sized (total assets between €10 and €43), and large firms (more than €43 million of total assets). The three profitability buckets correspond to the three

[22] The following link contains the SMEs definition, according to the European Commission, based among other characteristics, on the amount of total assets: http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition/index_en.htm

terciles implied by the distribution of the variable. Industry buckets are also used to classify firms. Finally, we organize the firms in a total of 940 buckets for all potential combinations of the four previous dimensions. The indicator of default for each firm in excess of the average indicator in the corresponding control group is then regressed on a constant variable. We perform two regression analyses for the two types of guarantees using two different time periods corresponding to the year in which the loans were granted: 2006-2010 and 2012-2013. The coefficients obtained in this regression analysis represent the probability of a loan default for those firms that pledged guarantees (treatment group) for the first time (i.e., we exclude latter uses of guarantees) in excess of the average probability of default of the corresponding control group.[23]

We perform a similar analysis to study the effect of guarantees requirements on firm performance. The dependent variable in the new analysis is the firm's ROA a year after the firm pledged guarantees for the first time in excess of the ROA of the control group. The control group consists of firms in the same industry with similar size, profitability, and risk profile that got the loan the same year as the corresponding firm in the treatment group but did not have guarantees after the granting of the loan. The firm risk is proxied by a dummy indicating whether the firm has been refinanced before the loan is granted. As in the case of the risk indicator, we form buckets along the previous dimensions and regress the firm excess ROA on a constant variable.

6.2. Results

As shown in the previous section, in October 2011 there is a bank guarantee policy change that causes an increase in the use of real collateral and, especially, personal guarantees. To assess the differential impact on firm risk and performance around this episode, we compare the risk profile and performance of the firms that secured their loans with guarantees for the first time before 2011 with those that secured their loans during 2012 and onwards.

[23] Standard errors of the corresponding regressions are clustered at the bucket level.

Table 11 shows the results of the experiment determining potential changes in firms' risk after the use of personal (columns (1-2)) and real (columns (3-4)) guarantees in excess of the average risk of the corresponding control group. Table 12 contains a similar analysis but based on firm performance instead of risk.

We observe that for the loans granted during the period 2006-2010, personal guarantees (column 1 of Table 11) led to a significant reduction in firm risk whereas the effect of real guarantees (column 3) is not statistically different from zero, consistently with the statement made in Hypothesis 3. In fact, the economic effect, obtained as the estimated coefficient for the treatment group relative to the average default probability of the treatment group before the event, is sizeable in the case of personal guarantees, i.e., -9.5%. This effect could be explained by the transformation in the nature of the firm responsibility in the presence of personal guarantees. The positive effect that personal guarantees exert on the loan default is not translated into a worse firm performance (see column 1 in Table 12).

However, in the analysis based on loans granted from 2012 and onwards, personal guarantees (column 2) do not exert a significant contribution to diminish risk-taking. The extensive use of personal guarantees in the second sub-period might have led to less selective decisions on the firms pledging guarantees given that they were used for regulatory purposes to improve capital ratios. Given that the requirements were not necessarily directed to discipline borrowers limiting their risk taking, the pledging of personal guarantees could have had a negligible effect on their posterior default risk. This and the high coverage ratios associated to this type of guarantees (see Figure 3); could have induced some borrowers to reduce even more their risk appetite, ultimately worsening their performance as shown in column (2) of Table 12.

According to our results, the use of personal guarantees before 2011 helped disciplining firms without damaging their performance but this positive effect vanished after the extensive usage of guarantees following October

Table 11: Guarantees and firm risk taking

This table shows evidence on the firm risk taking after the use of personal and real guarantees for the first time. Risk-taking is measured by means of a dummy variable that takes value one in case any firm loan defaults a year after the first time when the firm pledged guarantees, conditioned on not having defaulted prior to that event. We require that guarantees cover every single day during the three years following the guarantee setting. The treatment group consists of firms that pledged guarantees by the first time in the form of personal (columns (1-2)) or real (columns (3-4)) guarantees. The control group consists of firms in the same industry and with similar size and profitability that got the loan without guarantees the same year as the firm in the treatment group. The risk taking of each firm in excess of the average for the firms in the corresponding control group is then regressed on a constant variable, which is the coefficient reported in this table. Columns 1 and 3 report the results obtained for personal and real guarantees from the loans granted between 2006 and 2010 while columns 2 and 4 report the corresponding results for the two types of guarantees using the loans granted during the period 2012-2013. The standard errors of the corresponding regressions are clustered at group-firm level, where each group corresponds to firms with similar characteristics in terms of the previously mentioned dimensions. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
	Personal (2006-2010)	Personal (2012-2014)	Real (2006-2010)	Real (2012-2014)
Treatment Effect	-0.024**	0.001	0.028	0.048
	[0.010]	[0.015]	[0.020]	[0.030]
Observations	4,967	2,462	1,334	228

Table 12: Guarantees and firm performance

This table shows evidence on the firm performance after the use of personal and real guarantees for the first time. Performance is measured by means of the firm's ROA a year after the firm pledged guarantees by the first time in excess of the ROA of the control group. We require that guarantees cover every single day during the three years following the guarantee setting. The treatment group consists of firms that pledged guarantees by the first time in the form of personal (columns (1-2)) or real (columns (3-4)) guarantees. The control group consists of firms in the same industry with similar size, profitability, and risk profile that got the loan the same year as the corresponding firm in the treatment group but did not have guarantees after the granting of the loan. The firm performance in excess of the average performance of the firms in the corresponding control group is then regressed on a constant variable, which is the coefficient reported in this table. Columns 1 and 3 report the results obtained for personal and real guarantees from the loans granted between 2006 and 2010 while columns 2 and 4 report the corresponding results for the two types of guarantees using the loans granted during the period 2012-2013. The standard errors of the corresponding regressions are clustered at group-firm level, where each group corresponds to firms with similar characteristics in terms of the previously mentioned dimensions. ***, **, and * denotes statistical significance at 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
	Personal (2006-2010)	Personal (2012-2014)	Real (2006-2010)	Real (2012-2014)
Treatment Effect	-0.003	-0.004*	0.005	-0.005
	[0.002]	[0.002]	[0.003]	[0.006]
Observations	9,971	4,782	3,149	464

2011. The strategy adopted after that date can be positive in terms of financial stability since the bank can hedge potential defaults and improve capital ratios. Nevertheless, the use of personal guarantees with a higher coverage ratio implies that the risk ultimately relies on firm managers and this could penalize the efficiency of their decisions and their current and future enterprises. This result highlights that guarantees can also have costs, which are associated to their overuse.

7. Conclusions

This is the first comprehensive paper dealing with the different determinants, usefulness, and effectiveness of personal versus real guarantees. Based on a unique dataset containing information on the different kinds of guarantees granted, we first uncover significant differences related to the drivers of personal versus real guarantees. The requirements of personal and real guarantees respond differently to loan and firm characteristics. In sum, personal guarantees are mostly driven by economic conditions, while real guarantees are mostly explained by loan characteristics.

Secondly, we further investigate the economic conditions that affect differently the preference of each type of guarantee. Concretely, in view of Figures 1 and 2 we analyze the implications of the change in the bank guarantees policy in October 2011 that is the outcome of two events: i) the recommendations and measures following the July 2011 stress test results in an environment of weak economic conditions; and ii) the EU agreement for which European banks should increase their capital buffers. We document that both personal and real guarantees are used to improve loan's credit risk and regulatory capital requirements, but personal guarantees were preferred to real guarantees in the specific context of our analysis. Thus, in spite of the potential limitations of the personal guarantees to reduce RWA (i.e., personal guarantees should satisfy strict requirements to be considered effective and so, not all personal guarantees can be used to reduce RWA), the more rapid and efficient collateral execution of the

personal guarantees jointly with higher coverage ratios and the lack of real assets to be used as collateral; could justify their extended use.

Finally, we study the effect of guarantees' requirements on the firm itself and document that personal guarantees led to a decline in firm risk before the widespread usage of this type of guarantees after October 2011. From a policy perspective, this would call for a more widespread use of personal guarantees in loan contracts in order to reduce excessive risk-taking on the side of firms. Interestingly, the October 2011 policy episode induced the bank to increase lending against personal guarantees with higher coverage ratios as a result. However, despite their effectiveness prior to 2011, their later overuse led to a higher cost in the form of lower profitability, probably due to their limiting effect on managers' investments in forthcoming projects.

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