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# Debt Underreporting

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## Debt Underreporting

### ABSTRACT

Using an extensive sample of private firms, we document a striking fact; a substantial percentage of firms underreport debt obligations in their balance sheets. We identify debt underreporting by comparing amounts reported in firms' financial statements and the corresponding amounts reported by banks to the public credit registry of the country's central bank. The average difference between the two amounts is 5% of total assets. Underreporting is more frequent among unaudited firms with higher financing needs and higher financing costs searching for new credit. Most banks appear to see through it; underreporting persists only one period and is followed by lower bank credit, financial distress, and firms' delayed payment to suppliers. These results suggest that banks' mandatory disclosure to a public credit registry and the sharing of such information among them is instrumental in detecting firms' accounting fraud. As such, our evidence raises the concern about undetected debt underreporting in countries without a public credit registry, the U.S. being a prominent example.

**Keywords:** *Debt Underreporting, Financial Distress, Public Credit Registries, Accounting Fraud, Financing Structure, Credit Supply, Debt Default.*

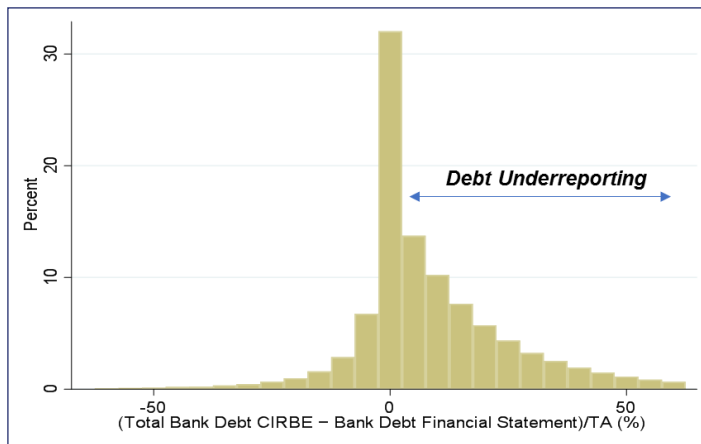
**JEL Classification:** G21, G30, M41.

## 1. INTRODUCTION

This paper documents a striking fact: a significant number of private firms under-report debt obligations in their balance sheets. Based on comprehensive data on the outstanding debt reported by bank lenders to the public credit register of the Bank of Spain (called “CIRBE”) and balance sheet information reported by borrowers, we observe that the amounts reported to CIRBE are often *higher* than the corresponding amounts reported in financial statements.<sup>1</sup> As illustrated in Figure 1, for a significant fraction of the sample firms facing financial difficulties, the magnitude of debt underreporting is substantial (i.e., greater than 10% of the book value of assets).

**Figure 1. CIRBE vs. financial statements: Difference in reported debt amounts**

This figure presents the frequency distribution firm-level differences between the amount of bank debt reported by banks to CIRBE and the corresponding balance sheet amount reported by the firm, both scaled by total assets. The analysis focuses on financially constrained firms (i.e., firms with above-median short-term debt or financial expenses that apply for a loan to a bank without a previous lending relationship with the firm).



The previous pattern is unlikely to be driven by differences between the two sources of debt information in terms of coverage, time, accuracy, or accounting criteria (see

<sup>1</sup> “CIRBE” stands for “Central de Información de Riesgos del Banco de España”. The registry is also referred to as “CIR” (see [https://www.bde.es/bde/en/secciones/servicios/Particulares\\_y\\_e/Central\\_de\\_Infor/Central\\_de\\_Info\\_04db72d6c1fd821.html](https://www.bde.es/bde/en/secciones/servicios/Particulares_y_e/Central_de_Infor/Central_de_Info_04db72d6c1fd821.html)).



Section 6 for a detailed discussion). First, the coverage of CIRBE is almost universal (see Jiménez et al., 2012, 2014 for examples of papers in the economics and finance literature exploiting the unique coverage of our dataset).<sup>2</sup> Second, banks must report monthly to CIRBE, which allows us to match the timing of the balance sheet amounts and the CIRBE amounts, thereby excluding the possibility that this pattern is the result of comparing numbers measured at different points in time. Third, the accuracy of the CIRBE data is verified by the Bank of Spain, as this information is an important input for bank supervision, regulation, and monetary policy. Fourth, we also document underreporting among standard loans, which are subject to the same accounting treatment in CIRBE and in firms' balance sheets.

There is anecdotal evidence supporting the notion that the difference between the balance sheet amounts and the CIRBE amounts reflects opportunistic reporting. Pescanova is an extreme and well-publicized example of this. The firm was prosecuted for financial fraud on the grounds of hiding corporate debt from financial statements and accounting for false revenues. The debt reported in the 2011 financial statements of the parent company was around 393 million euros, whereas the corresponding amount reported to CIRBE was over 1,698 million euros. The fraud was discovered in 2013.<sup>3</sup>

We conduct several tests to understand why firms understate their debt. We find that firms reporting debt amounts below those in the credit register are more likely to face financing difficulties in that year. We also observe that, in the year of misreporting, these firms apply for new credit, are more exposed to liquidity risk (they exhibit higher levels of short-term debt), and face higher financial expenses. As a placebo test, we conduct a parallel analysis focusing on cases in which the debt reported to

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<sup>2</sup> To illustrate the wide coverage of CIRBE consider that, in 2018, 216 financial entities reported information about 1 million non-financial corporations. The amount of outstanding credit reported to the database in that year was approximately 0.5 trillion euros (for reference, consider that the Spanish GDP in 2018 was roughly 1.2 trillion euros).

<sup>3</sup> The fraud was discovered when the chairman of the board (and CEO) requested additional funds from the main shareholders (through the granting of a loan). The request was perceived as inconsistent with the information in the previously reported financial statements. According to testimonies before the court, the audit firm and most affected banks did not check the information with CIRBE. One of the affected banks did detect inconsistencies between CIRBE and balance sheet information and formally requested information to Pescanova shortly before the scandal broke out. The CEO, the CFO, the person in charge of the accounting, and the auditor received prison sentences (the auditing firm was declared liable). For more details, see <https://www.cnbc.com/id/100647974>.

CIRBE is *lower* (rather than *higher*) than the debt reported in financial statements (this analysis is a placebo because firms do not have obvious incentives to “overreport” their debt). We find that in these cases the differences in debt value (between CIRBE and firms’ financial statements) are uncorrelated with the above-mentioned determinants of underreporting.

As an alternative way to gauge whether the results of our analysis of the determinants of underreporting are indeed driven by reporting incentives, we repeat the previous tests partitioning the sample based on whether the financial statements are audited (auditing is not mandatory for a large part of our sample of private firms). This analysis is grounded on prior literature showing that, if unaudited, financial statements are less informative about future cash flows (e.g., Minnis, 2011). Consistent with the notion that our previous results reflect reporting incentives, we find that the hypothesized determinants of underreporting are not statistically significant in the subsample of firms with audited financial statements.

To further corroborate that debt underreporting is driven by financing needs, we focus on loan applications to banks without a previous relationship with the potential borrower (without information from previous relationship lending with the firm, these banks are more likely to assess credit risk based on balance sheet information). Consistent with our interpretation of prior results, we find that, compared to other firms, underreporting firms are more likely to apply for new loans to banks without a previous relationship.

We also explore whether banks see through misreporting. Critically, banks have access to CIRBE and thus can compare, as we do, the credit obligations reported by borrowers in the financial statements and those reported by banks to the CIRBE system. We observe a negative association between debt underreporting and future changes in total liabilities, loans outstanding, and total bank debt, respectively. This evidence is consistent with the idea that, on average, banks detect underreporting and deny credit to underreporting firms.

To corroborate this interpretation, we further exploit the granularity of our data and conduct two additional analyses. First, we analyze bank-firm pairs and find that banks that had entered into debt contracts with underreporting firms in the past provide less credit to underreporting firms. Second, focusing on firms that obtain credit from a bank without a previous lending relationship with the firm, we document that underreporters obtain a significantly lower amount of credit from banks that verify their

creditworthiness using CIRBE compared to banks that do not. These analyses include bank-year and firm-year fixed effects, and thus control for confounding variation in the supply and demand for credit.

We further confirm our inferences by analyzing the persistence of debt underreporting over time. Our results show that debt underreporting exhibits weak first-order autocorrelation, but the pattern does not persist beyond two periods. That is, firms give up relatively soon on debt underreporting, conceivably because most banks see through firms' attempts to hide part of their credit obligations.

To fully characterize the phenomenon of debt underreporting, we analyze whether underreporters subsequently default on their payment obligations. First, we focus on firm payments to suppliers. Our results show that debt underreporting is followed by a significant increase in the average payment period to suppliers. Second, we focus on firm payments to banks. Following debt underreporting, firms exhibit higher levels of non-performing loans, charge-offs, and insolvency.

These results should be of interest to regulators and market participants. Our evidence begs the question of whether there is substantial undetected debt underreporting in countries that do not have public credit registries (PCRs).<sup>4</sup> As such, our paper informs the ongoing debate on the costs and benefits of creating a national PCR to which banks are required to disclose their clients' credit information. This debate has been particularly relevant in the recent U.S. election, as Joe Biden endorsed the creation of a public credit registry to compete with the major credit bureaus operated by private companies (i.e., Equifax, Experian, and TransUnion).<sup>5</sup> To the extent that PCRs include comprehensive data reported through a regulatory mandate, our evidence suggests that PCRs can be effective instruments to detect misreporting of credit obligations.

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<sup>4</sup> The U.S. is a case in point. In these countries, banks often report credit information to private credit bureaus but the reporting is voluntary, which results in incomplete information about borrowers.

<sup>5</sup> The proposal was motivated by a political will to extend the access to credit to the most disadvantaged sections of the population and by concerns about data security. Under the proposal by the "Unity Task Force on the Economy", federally backed lenders — including mortgage originators — would be required to use the new agency's reports to evaluate applicants for credit. The new agency would be housed within the Consumer Financial Protection Bureau (CFPB). In addition, private credit bureaus would be required to provide data to the federal agency. Critics of the proposal argued on grounds of government overreach and the quality of the resulting credit reports. See, for example, <https://www.americanbanker.com/news/industry-bristles-at-biden-proposal-for-public-credit-reporting-agency>.

Our results could also open a debate on whether to grant access to PCRs to stakeholders other than banks (notably suppliers and clients), as these stakeholders are affected by debt underreporting (they bear significant costs from related companies' financial distress). This is particularly important in situations of increased risk of default, as these other stakeholders often end up positioned behind banks in the pecking order. The current crisis is a case in point.

One natural question in light of our results is as follows: why do firms engage in debt underreporting if banks generally see through it? On the benefit side, one possible explanation is that sometimes this reporting strategy appears to be effective. The aggregated credit obtained by our sample firm-year observations exhibiting underreporting is an average of 5.3 billion euros per year. While this is a relatively small percentage (1.6%) of the corresponding amount aggregated across all firm-year observations, this figure suggests that banks approve a non-negligible number of applications for new credit filed by underreporting firms.

On the cost side, the probability of prosecution for debt underreporting is relatively small. According to studies based on U.S. public firms, the revelation of a misstatement by the SEC is a rare event, and even rarer when it comes to misstatement of liabilities (Dyck et al., 2017; Dechow et al., 2011). The probability of prosecution is likely to be even lower among private, unaudited firms in jurisdictions with weaker institutions and less intensive enforcement. In fact, there are very few cases of prosecution for debt underreporting in our sample. While underreporters are unlikely to obtain future funding from banks that detect these firms' misreporting, this does not necessarily preclude the possibility of obtaining credit from other banks. As such, it is likely that, ethical considerations aside, debt underreporting is an optimal strategy for firms facing urgent financial needs.

A related question would be: why do some banks accept applications from underreporting firms? One possibility is that, at these banks, the employees in charge of granting new credit do not always check the CIRBE. Such omission could be due to work overload or malpractice. Indeed, prior literature documents substantial time-series and cross-sectional variation in the intensity of banks' financial statement verification.<sup>6</sup> Another potential reason is that, while being aware of the risk, some banks accept the applications of underreporters because they follow a "search-for-yield"

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<sup>6</sup> See, for example, Cole et al. (2004), Cassar et al. (2015), Berger et al. (2017), Lisowsky et al. (2017), Minnis and Sutherland (2017).

strategy, that is, the banks are willing to assume a higher risk to obtain higher returns or to expand their customer base.<sup>7</sup>

Our paper adds to the burgeoning literature on the costs and benefits of mandatory disclosure. Extant research documents substantial benefits of disclosure mandates in the form of lower trading costs (see Leuz and Wysocki, 2016 for a literature review) and investment efficiency (e.g., Badertscher et al., 2013). In contrast, recent work has also studied the downside of disclosure regulation by documenting the presence of proprietary costs (e.g., Badia et al., 2020; Bonetti et al., 2020; Breuer, 2021). We contribute to this literature in two ways. First, we provide evidence on one important benefit of mandatory disclosure: the detection of misreporting. Second, we focus on a type of disclosure mandate that has not been studied by prior accounting literature, that is, requiring banks to disclose credit information on their clients. Our setting differs from other types of disclosure mandates examined by prior work not only in its nature, but also in the dissemination of this information (i.e., the information is not publicly released and only banks and bank supervisors have access to it).

This paper is also related to the literature on accounting misreporting (see Amiram et al., 2018, and Bao et al., 2020 for recent reviews). Our paper contributes to this literature in several ways. First, we identify a new mechanism to curb misreporting; our results highlight that credit information sharing through public credit registries can be effective in detecting misreporting. Second, while prior literature on misreporting generally focuses on P&L accrual manipulation, we document misreporting of a key balance sheet item: outstanding bank debt obligations. Third, our setting addresses a well-known limitation of prior literature, namely, the lack of data on *undetected* misreporting (for example, the widely-used database on Accounting and Auditing Enforcement Releases issued by the SEC includes only cases of *detected* misreporting). Our dataset allows us to identify all cases of debt misreporting regardless of whether they were detected and/or prosecuted. Fourth, our study is also related to the burgeoning literature on accounting quality in non-listed corporations (Minnis, 2011; Lisowsky and Minnis, 2020). Prior literature rarely studies misreporting behavior at non-listed companies, as in the U.S. these firms are not mandated to publicly disclose their financial reports. Our dataset allows us to overcome this limitation; the combined database we exploit contains comprehensive information on private firms.

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<sup>7</sup> See, for example, Boyd and De Nicoló (2005), Ioannidou and Ongena (2010), Maddaloni and Peydró (2011), Becker and Ivashina (2015), López-Espinosa et al. (2017), Morais et al. (2020).

Our paper also contributes to prior literature on the economics of credit information sharing (see Appendix B for detailed background information).<sup>8</sup> One strand of this literature studies whether public credit registries and privately-owned bureaus have different implications in the credit market. This literature usually finds that both mechanisms provide similar benefits to the financial system (e.g., Jappelli and Pagano, 2002; Djankov et al., 2007; Büyükkarabacak and Valev, 2012). Nonetheless, there is also evidence of distinctive effects; these alternative information-sharing mechanisms often focus on separate segments of the market and affect foreign bank entry and managerial perceptions differently (San Jose, 2002; Tsai et al., 2011; Love and Mylenko, 2003). Moreover, while public credit registries can help bank supervisors monitor banks' risk-taking, private credit bureaus cannot be used for this purpose. Our evidence hints at a so-far unexplored role of public credit registries in the corporate governance system, namely the detection of debt misreporting. Private credit bureaus are unlikely to play this role, as the information they contain is not comprehensive (the reporting to private credit bureaus is voluntary). Thus, it is not possible to identify debt underreporting by comparing the information in private credit bureaus to that in firms' financial reports. We look forward to future research revealing other potential applications of the information gathered at public credit registries.

Finally, the results of this study are also related to the literature modeling corporate bankruptcy based on accounting information (see Beaver et al., 2010 for a review). Our evidence suggests that debt underreporting often precedes insolvency procedures and payment defaults. Whether the explanatory power of this type of misreporting is high enough to justify using it to predict financial distress is an issue we leave for future work.

The remainder of the paper proceeds as follows. Section 2 presents the data, describes measurement choices, and discusses key descriptive statistics. Section 3 explores the determinants of debt misreporting. Section 4 addresses the question of whether banks detect misreporting. Section 5 analyzes whether underreporting firms default on their payments. Section 6 presents additional analyses. Section 7 provides concluding remarks.

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<sup>8</sup> On the theoretical side, this research provides a rationale for credit information sharing among lenders based on the mitigation of lender-borrower frictions in the lending market (i.e., adverse selection and moral hazard), competition among lenders, and supervision of borrowers' risk-taking (Pagano and Japelli, 1993, 2006; Padilla and Pagano, 1997). On the empirical side, the literature shows that information sharing affects credit market performance; higher levels of information sharing tend to increase lending volume, reduce the cost of credit and remove constraints on financing. More recently, Sutherland (2018) provides evidence that, while such information sharing reduces relationship-switching costs, it also induces lenders to transition away from relationship contracting.

## 2. DATA AND MEASUREMENT

### 2.1 DATA

Our paper combines four different datasets. The first dataset is the public credit registry managed by the Bank of Spain, commonly known as “Central de Información de Riesgos del Banco de España” (CIRBE). The registry records all the loans (new and outstanding), credit lines, bank endorsements, and other types of lending granted by all monetary financial institutions domiciled in Spain to firms incorporated in the country. Every month, banks must report information to CIRBE about all granted corporate loans (new and outstanding) greater than 6,000 euros.<sup>9</sup> The public credit registry managed by the Bank of Spain (CIRBE) was created in 1962 with the objective of improving the analysis and monitoring of credit risk. The access to CIRBE is restricted to the Bank of Spain and to the financial institutions operating in Spain (both those incorporated in the country or foreign branches). Banks receive information from CIRBE on a monthly basis.<sup>10</sup> The information includes data on their existing customers in an aggregated form. That is, banks observe the total amount borrowed by their customers but not the breakdown by lender in cases where the customer borrows from more than one bank. Banks can also request aggregated information on potential customers provided these potential customers are applying for a loan at the bank. Borrowers (either natural or legal persons) may request their own data from CIRBE, but they cannot access other borrowers’ data. Importantly, the dataset contains the fiscal identity of both the borrower and the lender, which enables us to construct a matched bank-firm data set.

The second data source is generally known as “Central de Balances” (CB), in English, “Central Balance Sheet Data Office”. The data collected by CB includes financial information filed by non-financial firms with the official trade registry (known as “Registro Mercantil”). The coverage of this dataset is extensive, as all Spanish firms are required to file their financial statements with the official trade registry.<sup>11</sup>

<sup>9</sup> This threshold was eliminated in Circular 1/2013 of Banco de España (implemented in 2016).

<sup>10</sup> Banks automatically receive information from customers for which they have an outstanding balance higher than 6,000 euros. This threshold was increased up to 9,000 euros in Circular 1/2013 of Banco de España.

<sup>11</sup> The dataset does not cover the whole universe of Spanish firms because some firms do not report to the official trade registry despite the mandate. According to the Bank of Spain, the coverage of CB in 2017-2018 was 843,567 firms, which amounts to almost 60% of Spanish companies.

The third dataset contains comprehensive balance sheet information on Spanish commercial banks, savings banks, credit cooperatives and financial credit establishments. This information is collected by the Bank of Spain in its role as supervisor. Our fourth dataset contains all the requests for information on the credit situation of specific firms (i.e., banks' potential customers) made by banks to CIRBE. This information enables us to identify firms that are applying for a bank loan to a bank with which they have no outstanding credit balances.

## 2.2 SAMPLE

Our initial sample includes all Spanish non-financial firms with non-missing data in CB from 2008 to 2018 (7,107,992 firm-year observations).<sup>12</sup> To avoid measurement error, we apply several filters to this initial sample (see Table 1, Panel A). First, we exclude firms with no outstanding debt (i.e., no debt reported in their financial statements and no debt reported to CIRBE). This condition excludes a significant number of observations, as relying completely on equity financing is common among our sample of private firms. Second, we leave out firms that are part of a business group; in these cases, we cannot identify the ultimate user of the credit (the official borrower could be the parent company or another firm in the group under an intra-group agreement).

Third, we exclude observations without data on industry affiliation, firms that belong to holdings, and shell corporations. In addition, we also leave out firms with only one year of data, observations labelled as “low-quality” (the Bank of Spain assesses the quality of the information contained in the CB database), and firms with a negative cash balance. Finally, we restrict the sample to firms with fiscal year-end in December. This condition induces very little sample attrition (see Table 1, Panel A) and ensures that the CIRBE and CB amounts correspond exactly to the same point in time. This results in a final sample of 3,217,722 firm-year observations (an average of 292,628 firms per year) corresponding to 629,583 distinct firms.

Table 1, Panel B, presents the distribution of employment across industries (as the

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<sup>12</sup> We start the sample in 2008 because under the new Spanish Local GAAP effective from 2008, firms must mandatorily report in their balance sheets the breakdown of the different types of liabilities. This is important as this breakdown enables us to conduct more refined tests that address potential measurement concerns.



percentage of employees working in each industry) for the population of Spanish small and medium enterprises (SMEs) and the corresponding figure for our sample. For simplicity, we only report this information for three years in the early, middle, and later parts of our sample period. As shown in the table, the industry distribution in our sample is similar to that of the population of Spanish SMEs. In terms of number of employees, over the sample period our sample firms employ more than 20% of the workers at Spanish SMEs (for example, in 2017 our sample firms employed 1.8 million workers whereas the total workers employed by Spanish SMEs was 8.2 million). These statistics confirm the representativeness of our analysis.

### 2.3 MEASURING UNDERREPORTING

We identify debt underreporting by comparing data from CIRBE (i.e., our database of credit exposures reported by banks) and accounting data from CB (i.e., our database of financial statements reported by firms). We focus on the difference between the amount of bank debt of a given firm reported by banks (collected by CIRBE) as of December of year  $t$  and the corresponding amount reported in the firm's financial statements (collected by CB).<sup>13</sup>

Based on this difference, we define four measures of the degree of underreporting. We first compute the difference between the amount of total bank credit in CIRBE (including standard bank loans as well as other types of bank credit) and the corresponding balance sheet amount, both scaled by total assets and expressed in percentage terms.<sup>14</sup> We refer to this difference as  $Difference\_Total$ . We then define  $UR\_Total$  as  $Difference\_Total$  if  $Difference\_Total > 0$ , and zero otherwise. That is,  $UR\_Total$  is a censored distribution of  $Difference\_Total$  (censored at 0). To ensure that our inferences are not affected by relatively small differences between the CIRBE and balance sheet amounts that could be driven by measurement error, we construct two variants of this variable using higher censoring values (5% and 10% instead of 0).  $UR\_Total\_5\%$  equals  $UR\_Total$  if  $Difference\_Total \geq 5\%$ , and zero otherwise.  $UR\_Total\_10\%$  equals

<sup>13</sup> CIRBE does not include loans supplied by banks through foreign branches. However, this is not a problem for our analysis because such loans are extremely rare if not completely absent among our sample of SMEs. In fact, the omission of these loans would lead to bank debt overreporting, instead of underreporting.

<sup>14</sup> "Other types of bank credit" include trade loans (invoice discounting, factoring), leaseings, and irrevocable letters of credit, among others.

$UR\_Total$  if  $Difference\_Total \geq 10\%$ , and zero otherwise. To ensure that our inferences are not affected by the distributional properties of  $UR\_Total$ , we also measure under-reporting using  $UR\_Total\_I$ , an indicator variable that equals one if  $Difference\_Total \geq 10\%$ , and zero otherwise.

To make sure that our results do not hinge on sophisticated or off-balance debt obligations (firms could classify or value these debt instruments differently than banks), we define parallel variables focusing on standard bank loans.  $Difference\_Loans$  is the difference between the amount of (standard) bank loans outstanding in CIRBE and the corresponding balance sheet amount, both scaled by total assets and expressed in percentage terms. We then define  $UR\_Loans$  as  $Difference\_Loans$  if  $Difference\_Loans > 0$ , and zero otherwise.  $UR\_Loans\_5\%$  equals  $Difference\_Loans$  if  $Difference\_Loans \geq 5\%$ , and zero otherwise;  $UR\_Loans\_10\%$  equals  $Difference\_Loans$  if  $Difference\_Loans \geq 10\%$ , and zero otherwise.  $UR\_Loans\_I$  is an indicator variable that equals one if  $Difference\_Loans \geq 10\%$ , and zero otherwise.

**Table 1. Sample composition**

Panel A reports the number of firm-year observations for the initial dataset and for the sample used in our tests after applying filters to avoid measurement error. Panel B presents the distribution of employment across industries (as the % of employees working in each industry) for the total Spanish small and medium enterprises (SME's) and the corresponding figure for our sample.

Panel A. Sample selection	
<b># firm-year observations in the initial dataset</b>	<b>7,107,992</b>
(-) Observations without debt	(2,533,663)
(-) Observations from business groups	(954,652)
(-) Observations without sector information, holdings and "shell" corporations	(224,492)
(-) Firms with only one year of data	(108,123)
(-) Observations with low quality according to CB	(45,658)
(-) Firms with negative cash	(55)
(-) Firms whose fiscal month-end is not December	(23,627)
<b># firm-year observations in the resulting sample</b>	<b>3,217,722</b>

Panel B. Sample representativeness: Employment distribution						
	Spanish SME's			Our sample		
Industry	2010	2014	2017	2010	2014	2017
Agriculture	4.30%	4.10%	4.30%	2.45%	3.12%	3.25%
Industry	14.30%	13.90%	14.30%	20.57%	19.97%	19.78%
Construction	8.40%	5.90%	6.00%	16.70%	12.29%	13.23%
Services	73.10%	76.10%	75.40%	60.29%	64.63%	63.74%

## 2.4 DESCRIPTIVE STATISTICS

Table 2, Panel A, reports descriptive statistics of the variables we use in our tests. The magnitude of debt underreporting is substantial. The mean of  $UR\_Total$  is 4.96, suggesting an average underreporting of total bank credit of around 5% of assets. The mean of  $UR\_Loans$  is 2.91, suggesting an average underreporting of standard loans of around 3% of assets. Importantly for the power of our tests, the variation in underreporting is also substantial (the standard deviation of  $UR\_Total$  and  $UR\_Loans$  is around 15% and 12% of total assets, respectively). Table 2, Panel A, also reveals that underreporting of substantial magnitude ( $\geq 10\%$  of total assets) occurs with relatively high frequency (in 13% of the observations for total bank debt and in 7% of the observations for standard loans (see mean values of  $UR\_Total\_I$  and  $UR\_Loans\_I$ , respectively). As shown in Figure 1, the frequency and magnitude of underreporting among firms experiencing financial difficulties are much larger than the descriptives reported in Table 2.

The results from prior studies on other types of misreporting can help interpret the figures in Table 2. Regarding the incidence of misreporting, Dyck et al. (2017) estimate its frequency in a range of 5%-15%. Gerakos and Kovrijnykh (2013) find that approximately 27% of firms manipulate reported earnings. Regarding the intensity of misreporting, Gerakos and Kovrijnykh (2013) estimate the magnitude of accrual manipulation between 0.7% and 3.7% of total assets, and Hribar and Nichols (2007) report discretionary accruals of 10.1%. While these estimates are not directly comparable to ours (they study different types of opportunism and, consequently, use different metrics to measure misreporting), the figures in Table 2 suggest that debt underreporting is as pervasive and serious as other types of opportunistic disclosure studied by prior literature.

Table 2, Panel A, highlights other key characteristics of our sample. Our sample firms are relatively small (99% of them are SMEs) and are, on average, 11 years old. The financial statements of most of them are unaudited. The table also shows that our sample firms are generally profitable (the mean and median values of return on assets are greater than zero).

Table 2, Panel B, compares the characteristics of the sample firms that underreport their debt in a given year ( $UR\_Loans\_I=1$ ) to the characteristics of the sample firms that do not ( $UR\_Loans\_I=0$ ). As shown in the table, the firms underreporting their debt are smaller, have a lower ratio of equity to total assets (i.e., more leverage), are less profitable, and are younger than other firms. Regarding financial characteristics, these firms are also more likely to apply for new loans, are more exposed to liquidity risk (their share of short-term debt over total debt is larger), face higher financial expenses, and are less likely to audit their financial statements.

**Table 2. Descriptive statistics**

Panel A presents descriptive statistics for the variables used in our tests, including the number of observations (#Obs.), the mean, median (P50), standard deviation (SD), 10<sup>th</sup> percentile (P10), and 90<sup>th</sup> Percentile (P90). Panel B reports t-tests for the difference in the means between firm-year observations with/without loan underreporting (i.e.,  $UR\_Loans\_I=1$  and  $UR\_Loans\_I=0$ , respectively). See Appendix A for variable definitions. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Panel A. Pooled sample							
Variable	Units	#Obs.	Mean	P50	SD	P10	P90
UR_Total	%	3,217,722	4.96	0.00	15.19	0.00	13.87
UR_Total_5%	%	3,217,722	4.65	0.00	15.26	0.00	13.87
UR_Total_10%	%	3,217,722	4.26	0.00	15.28	0.00	13.87
UR_Total_I	0/1	3,217,722	0.13	0.00	0.33	0.00	1.00
UR_Loans	%	3,217,722	2.91	0.00	11.74	0.00	5.19
UR_Loans_5%	%	3,217,722	2.68	0.00	11.77	0.00	5.19
UR_Loans_10%	%	3,217,722	2.45	0.00	11.75	0.00	0.00
UR_Loans_I	0/1	3,217,722	0.07	0.00	0.25	0.00	0.00
Applications	0/1	3,217,722	0.26	0.00	0.44	0.00	1.00

<b>ST_Credit</b>	%	3,217,722	18.71	0.00	33.12	0.00	88.89
<b>Financial_Exp</b>	%	3,217,722	2.23	1.55	2.57	0.00	5.05
<b>Audited</b>	0/1	3,217,722	0.01	0.00	0.10	0.00	0.00
<b>Firm_Size</b>	log	3,217,722	5.79	5.79	1.37	4.05	7.54
<b>Firm_Equity</b>	%	3,217,722	17.38	25.39	76.31	-23.88	75.16
<b>Firm_ROA</b>	%	3,217,722	2.92	4.43	22.84	-11.49	19.99
<b>Firm_Age</b>	log	3,217,722	2.40	2.48	0.71	1.39	3.22
<b>App_NewBanks</b>	0/1	698,755	0.47	0.00	0.50	0.00	1.00
<b>Log(1+NewBanks)</b>	log	698,755	0.38	0.00	0.44	0.00	1.00
<b>ΔBank_Loans</b>	%	2,203,627	-0.83	-1.73	19.16	-12.52	11.13
<b>ΔBank_Total</b>	%	2,203,627	2.96	-1.05	38.69	-21.45	28.34
<b>ΔNonBank_Liabilities</b>	%	2,203,627	3.78	0.47	33.54	-15.70	22.77
<b>ΔTotal_Liabilities</b>	%	2,203,627	-0.57	-1.19	17.09	-10.43	9.29
<b>Bank_Size</b>	log	1,048	14.45	14.14	2.37	11.53	17.71
<b>Bank_Equity</b>	%	1,048	7.81	7.54	3.17	4.38	11.60
<b>Bank_Liquidity</b>	%	1,048	15.97	13.17	13.07	2.10	33.70
<b>Bank_Portfolio_NPL</b>	%	1,048	6.99	5.55	5.64	1.51	14.64
<b>Bank_Portfolio_RE</b>	%	1,048	63.21	66.87	17.06	44.50	78.74
<b>Payment_Delay</b>	0/1	1,677,824	0.43	0.00	0.49	0.00	1.00
<b>ΔPayment_Period</b>	Years	1,677,824	0.00	0.00	0.21	-0.15	0.16
<b>NPL</b>	0/1	2,203,679	0.04	0.00	0.19	0.00	0.00
<b>Chargeoff</b>	0/1	2,203,679	0.01	0.00	0.09	0.00	0.00
<b>Insolvency</b>	0/1	2,203,679	0.00	0.00	0.05	0.00	0.00

Table 2. Descriptive statistics (cont'ed)

Panel B. Partitioning by debt underreporting			
Variable	Debt Underreporting (UR_Loans_I=1) (1)	No Debt Underreporting (UR_Loans_I=0) (2)	Difference (1) - (2)
Applications	0.301	0.261	0.04***
ST_Credit	25.743	18.186	7.557***
Financial_Exp	2.655	2.199	0.456***
Audited	0.003	0.011	-0.008***
Firm_Size	5.073	5.840	-0.767***
Firm_Equity	1.773	18.547	-16.774***
Firm_ROA	0.775	3.084	-2.309***
Firm_Age	2.248	2.410	-0.162***
NPL	0.076	0.031	0.045***
Chargeoff	0.024	0.006	0.019***
Insolvency	0.007	0.002	0.004***

### 3. DETERMINANTS OF DEBT UNDERREPORTING

#### 3.1. FIRM-LEVEL DETERMINANTS

The previous considerations as well as the asymmetry of the distribution in Figure 1 suggest that the differences between the debt amounts reported by banks to CIRBE and the corresponding amounts reported by firms in their financial statements do not merely reflect inconsistencies in the measurement of the outstanding debt of our sample firms. To corroborate this interpretation, we next formally analyze whether such differences are associated with hypothesized determinants of debt underreporting.

We expect that firms understate their balance sheet debt amounts to influence lenders' beliefs about these firms' credit risk. Our expectation is grounded in theoretical literature on the interplay between misreporting and debt contracting (e.g., Guttman and Marinovic, 2018), and is consistent with empirical work suggesting that managers engage in misreporting around the issuance of public debt (Efendi et al., 2007).

Based on this prior work, we expect that the firms more likely to understate their debt are those with (i) higher financial needs, (ii) higher liquidity constraints, and (iii) higher cost of capital. That is, we expect underreporting to be more frequent among firms facing difficulties in obtaining funding.

We explore the empirical validity of these hypothesized determinants by estimating the following model:

$$\begin{aligned} \text{Underreporting}_{it} = & \delta_1 \text{Applications}_{it} + \delta_2 \text{ST\_Credit}_{it} \\ & + \delta_3 \text{Financial\_Exp}_{it} + \varphi \text{Controls}_{it} + m_i + u_t + e_{it} \quad (1) \end{aligned}$$

where  $\text{Underreporting}_{it}$  of firm  $i$  in year  $t$  is one of the previously defined eight variables measuring debt underreporting, namely  $\text{UR\_Total}$ ,  $\text{UR\_Total\_5\%}$ ,  $\text{UR\_Total\_10\%}$ ,  $\text{UR\_Total\_I}$ ,  $\text{UR\_Loans}$ ,  $\text{UR\_Loans\_5\%}$ ,  $\text{UR\_Loans\_10\%}$ , and  $\text{UR\_Loans\_I}$ .

To capture the hypothesized determinants of debt underreporting, equation (1) includes three variables measuring the need for additional funding, the need for liquidity, and the financial costs of the firm, respectively.  $\text{Applications}_{it}$  is an indicator variable that is equal to one if firm  $i$  has applied for a loan to a bank at any time during year  $t$ , and zero otherwise.  $\text{STCredit}_{it}$  is firm  $i$ 's fraction of short-term bank debt over total liabilities in year  $t$ .  $\text{Financial\_Exp}_{it}$  is firm  $i$ 's ratio of financial expenses over total liabilities in year  $t$ .

The vector  $\text{Controls}_{it}$  includes measures of key firm characteristics as well as variables that prior research has found to be associated with misreporting and fraud: firm size, leverage, profitability, and age (see Appendix A for the definition of these variables).<sup>15</sup> Finally, the specification includes firm and year fixed effects ( $m_i$  and  $u_t$ , respectively).

Table 3 reports the outcome of estimating equation (1). The results confirm the descriptive analysis in Table 2, Panel B; in the year they engage in debt underreporting, firms are more likely to apply for new credit, are more exposed to liquidity risk (they exhibit higher levels of short-term bank debt), and face higher financial expenses. These results hold for all eight measures of debt underreporting (see Panels A and B). To further ensure that our inferences are not affected by measurement error, we restrict our sample to those firms that rely exclusively on standard bank loans. As shown in Table 3, in Panel C, this restriction does not affect our inferences.

<sup>15</sup> See, for example, Cecchini et al. (2010), and Dechow et al. (2011).

**Table 3. Determinants of debt underreporting**

This table analyzes the hypothesized determinants of debt underreporting. The dependent variables in Panel A are: *UR\_Total* is equal to *Difference\_Total* (i.e., the difference between the amount of total bank credit in CIRBE and the corresponding balance sheet amount, both scaled by total assets) if *Difference\_Total* is greater than zero, and zero otherwise. *UR\_Total\_5%* equals *Difference\_Total* if *Difference\_Total*  $\geq$  5%, and zero otherwise. *UR\_Total\_10%* equals *Difference\_Total* if *Difference\_Total*  $\geq$  10%, and zero otherwise. *UR\_Total\_I* is an indicator variable that equals one if *Difference\_Total*  $\geq$  10%, and zero otherwise. The dependent variables in Panel B are: *UR\_Loans* is equal to *Difference\_Loans* (i.e., the difference between the amount of (standard) bank loans outstanding in CIRBE and the corresponding balance sheet amount, both scaled by total assets) if *Difference\_Loans* is greater than zero, and zero otherwise. *UR\_Loans\_5%* equals *Difference\_Loans* if *Difference\_Loans*  $\geq$  5%, and zero otherwise. *UR\_Loans\_10%* equals *Difference\_Loans* if *Difference\_Loans*  $\geq$  10%, and zero otherwise. *UR\_Loans\_I* is an indicator variable that equals one if *Difference\_Loans*  $\geq$  10%, and zero otherwise. In Panel C we restrict the sample to those firms that only have standard bank loans. *Applications* is an indicator variable equal to one if the firm applies for a loan to a bank in that year, and zero otherwise. *ST\_Credit* is short-term bank debt over total liabilities. *Financial\_Exp* is financial expenses over total liabilities. *Firm\_Size*, *Firm\_Leverage*, *Firm\_ROA*, and *Firm\_Age* are defined in Appendix A. Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Panel A. Total bank credit				
	Total bank credit			
Dep. variable:	<i>UR_Total</i>	<i>UR_Total_5%</i>	<i>UR_Total_10%</i>	<i>UR_Total_I</i>
Indep. variables:	(1)	(2)	(3)	(4)
<b>Applications</b>	0.823***	0.819***	0.791***	1.748***
	[0.045]	[0.045]	[0.046]	[0.106]
<b>ST_Credit</b>	0.024***	0.023***	0.021***	0.076***
	[0.003]	[0.003]	[0.003]	[0.008]
<b>Financial_Exp</b>	0.406***	0.409***	0.407***	0.820***
	[0.039]	[0.040]	[0.040]	[0.063]
<b>Firm_Size</b>	-5.064***	-5.113***	-5.168***	-5.622***
	[0.279]	[0.278]	[0.278]	[0.279]
<b>Firm_Equity</b>	0.000	0.000	0.000	0.012***
	[0.001]	[0.001]	[0.001]	[0.001]
<b>Firm_ROA</b>	-0.005***	-0.005***	-0.005***	0.000
	[0.001]	[0.001]	[0.001]	[0.001]
<b>Firm_Age</b>	0.711**	0.703**	0.635*	1.894***
	[0.300]	[0.294]	[0.288]	[0.454]
<b>Firm FE</b>	YES	YES	YES	YES
<b>Year FE</b>	YES	YES	YES	YES
<b>Observations</b>	3,217,722	3,217,722	3,217,722	3,217,722
<b>R-squared</b>	0.678	0.675	0.670	0.593



Table 3. Determinants of debt underreporting (cont'ed)

Panel B. Standard bank loans				
	Standard loans			
Dep. variable:	<i>UR_Loans</i>	<i>UR_Loans_5%</i>	<i>UR_Loans_10%</i>	<i>UR_Loans_I</i>
Indep. variables:	(1)	(2)	(3)	(4)
Applications	0.459***	0.456***	0.438***	0.970***
	[0.024]	[0.024]	[0.025]	[0.056]
ST_Credit	0.005***	0.004***	0.002***	0.017***
	[0.000]	[0.000]	[0.000]	[0.001]
Financial_Exp	0.081***	0.082***	0.079***	0.196***
	[0.013]	[0.013]	[0.013]	[0.021]
Firm_Size	-4.047***	-4.044***	-4.019***	-5.853***
	[0.229]	[0.229]	[0.229]	[0.258]
Firm_Equity	0.001	0.001	0.000	0.010***
	[0.001]	[0.001]	[0.001]	[0.001]
Firm_ROA	-0.003***	-0.003***	-0.003***	0.000
	[0.001]	[0.001]	[0.001]	[0.001]
Firm_Age	0.676***	0.675***	0.624***	1.449***
	[0.191]	[0.187]	[0.182]	[0.298]
Firm_FE	YES	YES	YES	YES
Year_FE	YES	YES	YES	YES
Observations	3,217,722	3,217,722	3,217,722	3,217,722
R-squared	0.673	0.671	0.666	0.576

Panel C. Standard bank loans (subsample of firms with only standard bank loans)				
	Standard Loans			
Dep.variable:	<i>UR_Loans</i>	<i>UR_Loans_5%</i>	<i>UR_Loans_10%</i>	<i>UR_Loans_I</i>
Indep. variables:	(1)	(2)	(3)	(4)
Applications	0.598***	0.594***	0.575***	1.219***
	[0.029]	[0.029]	[0.030]	[0.062]
ST_Credit	0.006***	0.005***	0.004***	0.020***
	[0.000]	[0.000]	[0.000]	[0.001]
Financial_Exp	0.086***	0.087***	0.085***	0.183***
	[0.015]	[0.015]	[0.015]	[0.023]
Firm_Size	-4.445***	-4.456***	-4.446***	-6.014***

	[0.221]	[0.221]	[0.221]	[0.217]
<b>Firm_Equity</b>	0.003***	0.002***	0.002**	0.011***
	[0.001]	[0.001]	[0.001]	[0.001]
<b>Firm_ROA</b>	-0.003***	-0.004***	-0.004***	0.001
	[0.001]	[0.001]	[0.001]	[0.001]
<b>Firm_Age</b>	0.684***	0.684***	0.626***	1.502***
	[0.191]	[0.188]	[0.184]	[0.261]
<b>Firm FE</b>	YES	YES	YES	YES
<b>Year FE</b>	YES	YES	YES	YES
<b>Observations</b>	2,298,379	2,298,379	2,298,379	2,298,379
<b>R-squared</b>	0.694	0.692	0.688	0.607

### 3.2. UNDERREPORTING VS. OVERREPORTING

As a placebo test, we conduct a parallel analysis focusing on cases in which the debt reported to CIRBE is *lower* (rather than *higher*) than the debt reported in financial statements. These differences are unlikely to be driven by managerial opportunism, as firms do not have obvious incentives to “overreport” their debt. Rather, observing that the CIRBE amounts are lower than the financial statement amounts could respond to an exogenous restriction; during part of our sample period, CIRBE did not collect credit exposures of less than 6,000 euros per firm.

Table 4 repeats the analysis in Table 3 using measures of “overreporting” as a placebo test. In parallel to the dependent variables used in Table 3 (e.g., *UR\_Loans*, *UR\_Loans\_10%*, and *UR\_Loans\_I*), we define the three measures based on *Difference\_Loans*, which is the difference between the amount of standard bank loans as reported in CIRBE and the corresponding amount reported in the firm’s balance sheet, both scaled by total assets. *OR\_Loans* is  $|Difference\_Loans|$  (i.e., the absolute value of *Difference\_Loans*) if *Difference\_Loans* < 0, and zero otherwise. *OR\_Loans\_10%* equals  $|Difference\_Loans|$  if *Difference\_Loans* ≤ -10%, and zero otherwise. *OR\_Loans\_I* is an indicator variable that equals one if *Difference\_Loans* ≤ -10%, and zero otherwise.

Table 4 shows the results of this placebo test. In contrast to Table 3, the variables measuring the hypothesized determinants of debt underreporting (*Applications*, *STCredit*, and *Financial\_Exp*) exhibit no association with *OR\_Loans*, *OR\_Loans\_10%*, and *OR\_*

*Loans\_I*. The asymmetry between both sets of results (i.e., Table 3 and Table 4) is consistent with the notion that the patterns in Table 3 are driven by reporting incentives.

To further confirm this interpretation, column (7) of Table 4 presents the results of this analysis replacing the dependent variable with *Difference\_Loans* (i.e., we do not censor the negative values of this variable as we do in *UR\_Loans*). The results of column (7) show that our inferences are not affected by including cases in which *Difference\_Loans* < 0 (i.e., cases in which the debt reported in firms' financial statements exceeds the corresponding amount in CIRBE).

### 3.3. AUDITED VS. UNAUDITED REPORTS

To corroborate that the patterns in Table 3 are related to reporting discretion, we next explore whether the results vary with the degree of monitoring of firms' financial reporting practices. Specifically, we split the sample between firms with audited financial statements and firms with unaudited financial statements (auditing is mandatory for our sample of private firms over specific size thresholds).<sup>16</sup> The literature has shown the importance of auditors on accounting quality (e.g., Carpenter, 2007; Skinner and Srinivasan, 2012; Hribar et al., 2014; Lennox and Li, 2014), especially in the context of private firms (Minnis, 2011; Lisowsky et al., 2017; Lisowsky and Minnis, 2020). In the context of our setting, auditors are likely to detect debt underreporting because they can request CIRBE data from their clients (borrowers have access to their own CIRBE data) and use it as part of the auditing process. In light of all these considerations, we expect auditors to play a deterring role in debt underreporting.

The results in Table 5 are consistent with the notion that there is no debt underreporting when the firm's financial statements are audited. When we split the sample between firms with audited/unaudited financial statements, we find that the determinants of debt underreporting studied in Table 3 are not statistically significant in the subsample of firms with audited financial statements.<sup>17</sup>

<sup>16</sup> Auditing is mandatory if the company meets two out of three of the following criteria for two consecutive years: a) balance-sheet total: €2,850,000, b) net turnover: €5,700,000, c) average number of employees during the financial year: 50.

<sup>17</sup> In addition, unconditionally, the magnitude of underreporting for the sample of audited firms is much lower (*UR\_Loan* mean is 1.05%).

**Table 4. Underreporting vs. overreporting**

This table repeats the analysis in Table 3 using measures of overreporting as a placebo test. *UR\_Loans*, *UR\_Loans\_10%*, and *UR\_Loans\_I* are as defined in Table 3. *OR\_Loans*, *OR\_Loans\_10%*, and *OR\_Loans\_I* are the corresponding measures for “overreporting”. *OR\_Loans* is equal to  $|Difference\_Loans|$  (the absolute value of the difference between the amount of (standard) bank loans outstanding in CIRBE and the corresponding balance sheet amount, both scaled by total assets) if  $Difference\_Loans < 0$ , and zero otherwise. *OR\_Loans\_10%* equals *OR\_Loans* if  $Difference\_Loans \leq -10\%$ , and zero otherwise. *OR\_Loans\_I* is an indicator variable that equals one if  $Difference\_Loans \leq -10\%$ , and zero otherwise. *Applications*, *ST\_Credit*, and *Financial\_Exp* are as in Table 3. *Firm\_Controls* includes *Firm\_Size*, *Firm\_Equity*, *Firm\_ROA*, and *Firm\_Age* (defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	UR_Loans	OR_Loans	UR_Loans_10%	OR_Loans_10%	UR_Loans_I	OR_Loans_I	Difference_Loans
Indep. variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Applications</b>	0.459*** [0.024]	0.041 [0.030]	0.438*** [0.025]	0.042 [0.030]	0.970*** [0.056]	0.003 [0.002]	0.313** [0.105]
<b>ST_Credit</b>	0.005*** [0.000]	-0.000 [0.000]	0.002*** [0.000]	-0.000 [0.000]	0.017*** [0.001]	-0.0001*** [0.000]	0.017*** [0.002]
<b>Financial_Exp</b>	0.081*** [0.013]	0.010 [0.007]	0.079*** [0.013]	0.010 [0.007]	0.196*** [0.021]	0.001 [0.001]	0.073* [0.039]
<b>Firm Controls</b>	YES	YES	YES	YES	YES	YES	YES
<b>Firm FE</b>	YES	YES	YES	YES	YES	YES	YES
<b>Year FE</b>	YES	YES	YES	YES	YES	YES	YES
<b>Observations</b>	3,217,722	3,217,722	3,217,722	3,217,722	3,217,722	3,217,722	3,217,722
<b>R-squared</b>	0.673	0.513	0.666	0.513	0.576	0.617	0.712

**Table 5. The role of auditors**

This table repeats the analysis in Table 3 partitioning the sample into firms whose financial statements are not audited (“Non-audited”) and firms whose financial statements are audited (“Audited”). *Applications*, *ST\_Credit*, and *Financial\_Exp* are as in Table 3. *Firm\_Controls* includes *Firm\_Size*, *Firm\_Equity*, *Firm\_ROA*, and *Firm\_Age* (defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	UR_Loans		UR_Loans_10%		UR_Loans_I	
	Non-audited	Audited	Non-audited	Audited	Non-audited	Audited
Partition:	(1)	(2)	(3)	(4)	(5)	(6)
<b>Applications</b>	0.465*** [0.024]	0.152 [0.097]	0.443*** [0.025]	0.142 [0.097]	0.983*** [0.057]	0.225 [0.146]
<b>ST_Credit</b>	0.005*** [0.000]	0.001 [0.001]	0.003*** [0.000]	-0.000 [0.001]	0.017*** [0.001]	0.001 [0.004]
<b>Financial_Exp</b>	0.081*** [0.014]	-0.014 [0.070]	0.079*** [0.013]	-0.023 [0.071]	0.195*** [0.022]	0.049 [0.129]
<b>Firm Controls</b>	YES	YES	YES	YES	YES	YES
<b>Firm FE</b>	YES	YES	YES	YES	YES	YES
<b>Year FE</b>	YES	YES	YES	YES	YES	YES
<b>Observations</b>	3,182,497	29,751	3,182,497	29,751	3,182,497	29,751
<b>R-squared</b>	0.673	0.760	0.667	0.753	0.576	0.686

### 3.4. APPLICATIONS TO NEW BANK CREDIT

To further corroborate our interpretation of the patterns in Table 3, we next analyze whether firms that exhibit debt underreporting are more likely to apply for loans to banks without a previous relationship with the potential borrower. Underreporting is potentially more helpful to obtain credit from banks where no such previous relationship exists because, without information from previous relationship lending with the firm, these banks are more likely to assess credit risk based on balance sheet information.

Given the nature of this test, we focus on the subsample of firm-year observations in which the firm applies for additional credit. We identify applications for credit based on increases in the firm's credit balance with a given bank and based on CIRBE's data on banks' requests of information about firms.<sup>18</sup> We measure whether the firm had a previous relationship with the bank based on the credit balance of the firm with that bank in previous years (which is zero for banks with which the firm had no previous lending relationship).

Based on these firm-year observations, we estimate the following model:

$$App\_NewBanks_{it} = \delta 1 Underreporting_{it-1} + \varphi Controls_{it} + m_i + u_t + e_{it} \quad (2)$$

where  $App\_NewBanks_{it}$  is an indicator variable that equals one if in year  $t$  firm  $i$  applies for a loan to a "new" bank (i.e., a bank with which the firm *did not have* a previous relationship), and zero if in year  $t$  firm  $i$  applies for a loan to banks with which the firm *had* a previous relationship.  $Underreporting_{it-1}$  is one of the three previously defined variables measuring debt underreporting, namely  $UR\_Loans$ ,  $UR\_Loans\_10\%$ , and  $UR\_Loans\_I$  (measured for firm  $i$  in year  $t$ ). For robustness, we repeat the analysis

<sup>18</sup> Our analysis includes observations with successful applications and unsuccessful applications submitted to banks that request information to CIRBE. However, our data does not allow us to identify some potential unsuccessful applications, namely those to banks that do not request information to CIRBE and those to banks with a previous relationship with the firm. While we acknowledge this limitation, we do not consider it a major concern, as the key source of variation in this analysis is not the success of the application. Rather, our focus in this section is whether the bank has a previous relationship with the firm. The analysis of whether banks are more likely to deny credit applications to underreporting firms is presented in Section 4.

replacing  $App\_NewBanks_{it}$  with  $Log(1+NewBanks)_{it}$  namely the logarithm of (one plus) the number of “new” banks to which firm  $i$  applies for a loan in year  $t$ .

Table 6 presents the results of estimating equation (2). Consistent with our interpretation of prior results, we find that, compared to other firms and conditional on applying for credit, underreporting firms are more likely to apply for loans to “new” banks. The search for new banks is also consistent with the idea that underreporting firms face difficulties in accessing finance from their usual banks. This is critical, as these firms are relatively small and thus have relatively limited financing opportunities.

#### 4. THE DETECTION OF UNDERREPORTING

We next explore whether banks see through debt underreporting. Unlike other potential stakeholders of the firm (notably clients and suppliers), banks have access to CIRBE and can check whether the reported balance sheet debt coincides with the information reported by other banks to the Bank of Spain. Prior literature supports the notion that, in many cases, banks suspect the presence of financial misreporting at client firms, at least when it comes to ongoing relationships in which they can exploit their superior information about borrowers (e.g., Chen, 2016).

##### 4.1. CHANGES IN THE VOLUME OF BANK CREDIT

We first examine whether our measures of underreporting are correlated with changes in outstanding bank debt. Finding a negative association would be consistent with the notion that underreporting firms are not successful in their attempt to obtain new bank credit, suggesting that banks see through debt underreporting. In particular, we estimate the following equation using the whole sample of firm-year observations:

$$D\_Credit_{it} = \delta_1 Underreporting_{it-1} + \varphi Controls_{it} + m_i + u_t + e_{it} \quad (3)$$

where  $D\_Credit_{it}$  is one of the following two variables capturing subsequent changes in the amount of bank debt held by the firm.  $\Delta\_Bank\_Loans$  is the firm’s change in total standard loans outstanding between year  $t$  and  $t-1$ , deflated by total assets in year

**Table 6. Applications for credit to “new” banks**

This table analyzes the relation between underreporting and the probability of choosing a “new” bank when applying for new credit (the language “new” is used to refer to banks without a previous lending relationship with the firm). The sample is restricted to firms that request new credit in year  $t$ .  $App\_NewBanks$  is an indicator variable that equals one if the firm applied for credit to a “new” bank, and zero if the firm receives a loan from any bank with a previous relationship with the firm.  $Log(1+NewBanks)$  is the logarithm of (one plus) the number of “new” banks from which the firm applies for credit in year  $t$ .  $Underreporting_{i,t-1}$  is one of three measures of underreporting,  $UR\_Loans$ ,  $UR\_Loans\_10\%$ , and  $UR\_Loans\_I$ , as defined in Appendix A and divided by 100 to minimize the number of decimal places in the coefficients.  $Firm\_Controls$  includes  $Firm\_Size$ ,  $Firm\_Equity$ ,  $Firm\_ROA$ , and  $Firm\_Age$  (also defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	App_NewBanks			Log(1+NewBanks)		
	UR_Loans	UR_Loans_10%	UR_Loans_I	UR_Loans	UR_Loans_10%	UR_Loans_I
Measure of Underrep.:						
Indep. variables:	(1)	(2)	(3)	(4)	(5)	(6)
Underreporting <sub>it-1</sub>	0.046***	0.046***	0.014**	0.035**	0.035**	0.013***
	[0.013]	[0.013]	[0.004]	[0.011]	[0.011]	[0.004]
Firm Controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	698,755	698,755	698,755	698,755	698,755	698,755
R-squared	0.466	0.466	0.466	0.483	0.483	0.483

**Table 7. Changes in credit. Firm-level analysis**

This table analyzes the association between underreporting and subsequent changes in firms' outstanding debt. The dependent variables in Panel A are: the annual change in total loans outstanding, as reported in CIRBE ( $\Delta\_Bank\_Loans$ ) and the annual change in the total credit received from banks, as reported in CIRBE ( $\Delta\_Bank\_Total$ ). In Panel B we use the following dependent variables: the annual change in non-bank liabilities, as reported in the balance sheet ( $\Delta\_NonBank\_Liabilities$ ) and the annual change in total liabilities, as reported in the balance sheet ( $\Delta\_Total\_Liabilities$ ). All dependent variables are scaled by prior year's total assets. Underreporting<sub>it,t-1</sub> is one of three measures of underreporting,  $UR\_Loans$ ,  $UR\_Loans_{10\%}$ , and  $UR\_Loans_I$ , as defined in Table 3. Firm\_Controls includes Firm\_Size, Firm\_Equity, Firm\_ROA, and Firm\_Age (defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Panel A. Changes in bank credit						
Dep. variable:	$\Delta\_Bank\_Loans$			$\Delta\_Bank\_Total$		
Measure of Underrep.:	$UR\_Loans$	$UR\_Loans_{10\%}$	$UR\_Loans_I$	$UR\_Loans$	$UR\_Loans_{10\%}$	$UR\_Loans_I$
Indep. variables:	(1)	(2)	(3)	(4)	(5)	(6)
Underreporting <sub>it,t-1</sub>	-0.218***	-0.209***	-0.053***	-0.234***	-0.222***	-0.059***
	[0.012]	[0.011]	[0.003]	[0.012]	[0.011]	[0.003]
Firm Controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	2,203,627	2,203,627	2,203,627	2,203,627	2,203,627	2,203,627
R-squared	0.307	0.306	0.304	0.309	0.308	0.304

Panel B. Changes in other liabilities						
Dep. variable:	$\Delta\_NonBank\_Liabilities$			$\Delta\_Total\_Liabilities$		
Measure of Underrep.:	$UR\_Loans$	$UR\_Loans_{10\%}$	$UR\_Loans_I$	$UR\_Loans$	$UR\_Loans_{10\%}$	$UR\_Loans_I$
Indep. variables:	(1)	(2)	(3)	(4)	(5)	(6)
Underreporting <sub>it,t-1</sub>	0.077**	0.084***	0.001***	-0.141***	-0.125***	-0.083***
	[0.023]	[0.022]	[0.000]	[0.027]	[0.025]	[0.006]
Firm Controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	2,203,627	2,203,627	2,203,627	2,203,627	2,203,627	2,203,627
R-squared	0.383	0.383	0.480	0.389	0.389	0.390



$t-1$ . Because firms can obtain credit from banks through vehicles other than loans, we use an alternative dependent variable  $\Delta\_Bank\_Total$ , defined as the firm's change in the total credit obtained from banks between year  $t$  and  $t-1$ , deflated by total assets in year  $t-1$ . These measures are based on information from CIRBE, which is not subject to firms' opportunistic reporting.  $Underreporting_{i,t-1}$  of firm  $i$  in year  $t-1$  is one of the three previously defined variables measuring underreporting of the amount of loans outstanding, namely  $UR\_Loans$ ,  $UR\_Loans\_10\%$ , and  $UR\_Loans\_I$ .

Table 7, Panel A, reports the results of this test. Consistent with underreporting firms not being successful in their attempt to obtain new bank credit, the table shows that firms engaging in debt underreporting experience lower changes in bank debt. The result holds for both standard loans outstanding and total bank debt.

#### 4.2. CHANGES IN OTHER LIABILITIES

We next explore whether underreporting firms resort to alternative sources of credit (i.e., non-bank debt). Finding a switch from bank to non-bank credit would corroborate that banks deny credit to underreporting firms, suggesting that banks see through this type of misreporting. In contrast, if firms' bank debt decreases due to other reasons (for example, because the firm experiences less growth and thus has less financing needs), we should not observe a simultaneous increase in non-bank debt.

We redefine  $D\_Credit_{it}$  by replacing the previous dependent variables with  $\Delta\_NonBank\_Liabilities$ , defined as the firm's change in non-bank debt, between year  $t$  and  $t-1$ , deflated by total assets in year  $t-1$ . We also check whether the potential increase in non-bank debt makes up for the decrease in bank debt. We use as alternative dependent variable  $\Delta\_Total\_Liabilities$ , defined as the firm's change in total liabilities between year  $t$  and  $t-1$ , deflated by total assets in year  $t-1$ . These variables are measured using balance sheet information obtained from CB (CIRBE only contains information on bank debt).

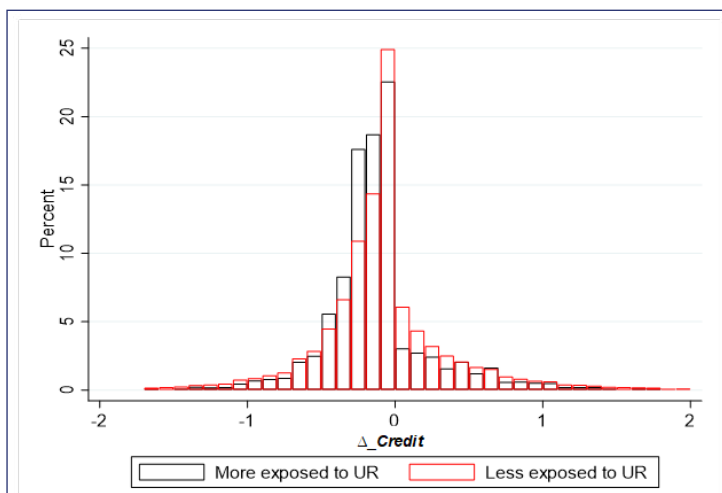
Table 7, Panel B, presents the results of these alternative tests. Consistent with the notion that firms resort to alternative sources of credit when rejected by banks, we observe that non-bank debt increases after debt underreporting. However, the results also show that debt underreporting is followed by a decrease in total debt, which suggests that the increase in other types of debt is not high enough to make up for the decrease in bank credit.

### 4.3. BANKS' PREVIOUS EXPOSURE TO UNDERREPORTING

To sharpen identification, we further exploit the granularity of our data and analyze cross-sectional variation in banks' previous exposure to underreporting. We start with a descriptive analysis of whether banks with more previous exposure are reluctant to grant credit to underreporters. Figure 2 presents the frequency distribution of annual log-changes in the amount of total credit granted by our sample banks to underreporting firms based on these banks' previous exposure to underreporting. Banks are classified as "more exposed"/"less exposed" to underreporting based on whether the fraction of total credit granted to underreporters in the previous year is in the top quartile (a firm is classified as an underreporter if  $UR\_Loans\_I = 1$ ). Consistent with the notion that banks do not persistently overlook underreporting, Figure 2 shows that the distribution of changes in credit granted by banks with previous exposure to underreporting is shifted to the left (that is, towards lower changes in credit).

**Figure 2. Banks' previous exposure to underreporting**

This figure presents the frequency distribution of annual log-changes in the amount of total credit granted by our sample banks ( $\Delta\_Credit$ ) to underreporting firms based on these banks' previous exposure to underreporting. Banks are classified as "more exposed"/"less exposed" to underreporting (UR) based on whether the fraction of credit granted to underreporting firms in the previous year is in the top quartile of the sample distribution. A firm is classified as "underreporter" if the difference between the amount of standard bank loans outstanding in CIRBE and the corresponding balance sheet amount is at least 10% of total assets.



More formally, we next estimate the following variant of equation (3) at the firm-bank-year level:

$$D\_Credit_{ibt} = \delta_1 Bank\_exposure\_UR_{bt-1} * Underreporting_{it-1} + \delta_2 Bank\_exposure\_UR_{bt-1} + \varphi Controls_{bt} + m_{it} + u_b + e_{ibt} \quad (4)$$

Following extant banking literature (e.g., Khwaja and Mian, 2008), we define  $D\_Credit_{ibt}$  as the log-change in the amount of (total) credit from bank  $b$  to firm  $i$  between years  $t$  and  $t-1$  (i.e.,  $\log(1 + Credit_{ibt}) - \log(1 + Credit_{ibt-1})$ ).  $Bank\_exposure\_UR_{bt-1}$  is defined as the fraction of the outstanding credit granted by the bank  $b$  to “underreporters” in year  $t-1$  (a firm is classified as “underreporter” if  $UR\_Loans\_I = 1$ ).  $Underreporting_{it-1}$  is one of three measures of underreporting,  $UR\_Loans$ ,  $UR\_Loans\_10\%$ , and  $UR\_Loans\_I$ , as defined in Table 3 and measured in  $t-1$ .  $Controls_{bt}$  is a vector of controls for bank characteristics, including size, leverage, liquidity, risk, and exposure to real estate (see Appendix A for a detailed definition of these control variables).

Equation (4) also includes a demanding fixed effect structure. By including firm-year fixed effects ( $m_{it}$ ), equation (4) exploits variation in bank credit within the same firm in a given year (a number of our sample firms borrow from more than one bank). The model also incorporates bank fixed effects to control for time-invariant variation in bank characteristics. To further tighten identification, we also estimate equation (4) replacing bank fixed effects with bank-year fixed effects. By including both firm-year and bank-year fixed effects, we isolate the variation in credit supply induced by the exposure to underreporters, as the model absorbs unobserved (and potentially confounding) variation in credit demand and credit supply.

Table 8 presents the results. The main effect of  $Bank\_exposure\_UR_{bt-1}$  is not significantly different from zero, which means that, on average, banks more exposed to underreporting provide similar volumes of credit as other banks. However, the coefficient on the interaction between  $Bank\_Exposure\_UR_{bt-1}$  and  $Underreporting_{it-1}$  is negative and statistically significant. This result suggests that banks previously exposed to underreporting provide relatively less credit to underreporting firms (as compared to other firms and other banks). Table 8 also shows that this pattern is robust to including bank-year fixed effects and holds across all our measures of debt underreporting. As such, the results in Table 8 are consistent with the notion that, while perhaps not always immediately, banks eventually become aware of debt underreporting.

**Table 8. Changes in credit. Bank-firm level analysis**

This table analyzes the association between underreporting and subsequent changes in firms' outstanding total bank credit as a function of banks' previous exposure to underreporting. The dependent variable is the log-change of the amount of total credit from bank  $b$  to firm  $i$  between year  $t$  and  $t-1$  ( $\Delta\_Credit_{it}$ ).  $Bank\_exposure\_UR_{bt-1}$  is the fraction of the outstanding credit granted by the bank  $b$  to underreporters in year  $t-1$ .  $Underreporting_{it-1}$  is one of three measures of underreporting,  $UR\_Loans$  (columns (1) and (2)),  $UR\_Loans\_10\%$  (columns (3) and (4)) and  $UR\_Loans\_I$  (columns (5) and (6)), as defined in Table 3. Columns (1), (3) and (5) include the following bank controls:  $Bank\_Size$ ,  $Bank\_Equity$ ,  $Bank\_Liquidity$ ,  $Bank\_Portfolio\_NPL$ , and  $Bank\_Portfolio\_RE$  (see Appendix A for variable definitions). Columns (2), (4) and (6) include bank-year fixed effects. Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	$\Delta\_Credit$					
Measure of Underrep.:	UR_Loans		UR_Loans_10%		UR_Loans_I	
Indep. variables:	(1)	(2)	(3)	(4)	(5)	(6)
<b>Bank_exposure_UR<sub>bt-1</sub></b>	-0.583		-0.597		-0.591	
	[2.408]		[2.407]		[2.403]	
<b>Bank_exposure_UR<sub>bt-1</sub> x Underreporting<sub>it-1</sub></b>	-1.642**	-2.207***	-1.501**	-2.017***	-0.530*	-0.911***
	[0.668]	[0.525]	[0.668]	[0.532]	[0.313]	[0.210]
<b>Bank Controls</b>	YES	NO	YES	NO	YES	NO
<b>Firm-Year FE</b>	YES	YES	YES	YES	YES	YES
<b>Bank FE</b>	YES	NO	YES	NO	YES	NO
<b>Bank-Year FE</b>	NO	YES	NO	YES	NO	YES
<b>Observations</b>	2,628,580	2,629,513	2,628,580	2,629,513	2,628,580	2,629,513
<b>R-squared</b>	0.324	0.428	0.324	0.428	0.324	0.428

#### 4.4. BANKS' REQUESTS OF INFORMATION TO CIRBE

As an alternative way of exploring whether banks see through debt underreporting, we analyze cross-sectional variation in banks' consultation of CIRBE of specific firms. Measuring variation in banks' consultation to CIRBE requires focusing the analysis on firms that obtain credit from a given bank without a previous lending relationship. That is, rather than exploiting variation based on whether the firm applies for a loan to a new bank (as in Table 6), we exploit variation in the granted volume of credit, conditional on the firm applying for and obtaining a loan from a "new" bank (i.e. a bank without a previous lending relationship with the firm). We follow the same procedure as in section 3.5 to obtain the subsample of firm-year observations in which the firm applies for a loan. This requirement reduces the sample to 194,413 firm-bank-year observations. Restricting the sample in this way is unlikely to reduce the power of our tests; Table 6 suggests that this is the subsample with the highest probability of exhibiting debt underreporting.

A descriptive analysis of the credit granted by our sample banks suggests that the consultation at CIRBE plays a role in lending decisions. In particular, we observe that, out of the 2.5 billion euros granted to underreporters (i.e., firms with  $UR\_Loans\_I = 1$ ) by banks without a previous lending relation with these firms, 1.7 billion (68%) are granted by banks that do not request information about the potential borrower to CIRBE.

To analyze more formally the role played by banks' consultation to CIRBE, we estimate the following model at the bank-firm-year level:

$$D\_Credit_{ibt} = \delta_1 Bank\_CIRBE_{bit} + \delta_2 Bank\_CIRBE_{bit} * Underreporting_{it-1} + \varphi Controls_{bt} + m_{it} + u_{bt} + e_{ibt} \quad (5)$$

where  $D\_Credit_{ibt}$  is as in equation (4).<sup>19</sup>  $Bank\_CIRBE_{bit}$  is an indicator variable that equals one if bank  $b$  requests information to the CIRBE on firm  $i$  in year  $t$ , and zero otherwise.  $Underreporting_{it-1}$  is one of three measures of underreporting,  $UR\_Loans$ ,  $UR\_Loans\_10\%$ , and  $UR\_Loans\_I$ , as defined in Table 3 and measured in  $t-1$ . The remaining variables are as in equation (4) (see Appendix A for variable definitions). As in the previous test, we re-estimate equation (4) including both firm-year and bank-

<sup>19</sup> Note that since this analysis is conducted on firms financed by banks with no previous relationships, this is equivalent to using the logarithm of the new credit in year  $t$  (given that credit in year  $t-1$  is zero).

year fixed effects to control for the determinants of the demand and supply for credit. In this way, we empirically identify the variation in credit supply induced by banks' consultation of CIRBE.

Table 9 presents the results from estimating equation (5). The coefficient on the interaction between  $Bank\_CIRBE_{bit}$  and  $Underreporting_{it-1}$  is negative and significant. The main effect of  $Bank\_CIRBE_{bit}$  is positive. That is, banks' request of information on the creditworthiness of a given firm results in a larger amount of credit granted to that firm. However, the credit amount is lower when the firm underreports its debt. The linear combination of both coefficients is negative and statistically different from zero, suggesting that underreporters obtain lower amounts of credit from banks that verify their creditworthiness in CIRBE (as compared to the credit volume obtained from banks that do not).

**Table 9. CIRBE information and credit supply to underreporters**

This table analyzes changes in credit supply to underreporters based on whether the bank requests information to CIRBE. The analysis is based on firm-bank-year observations where the firm obtains credit from a bank without a previous relationship with the firm. The dependent variable is the log-change in the amount of total credit from bank  $b$  to firm  $i$  between years  $t$  and  $t-1$  ( $\Delta\_Credit_{bit}$ ).  $Bank\_CIRBE_{bit}$  equals one if bank  $b$  requests information to CIRBE about firm  $i$ , a firm that applies for credit in that bank in year  $t$ .  $Underreporting_{it-1}$  is one of three measures of underreporting,  $UR\_Loans$  (column (1)),  $UR\_Loans_{10\%}$  (column (2)) and  $UR\_Loans\_I$  (column (3)), as defined in Table 3. The specifications include both firm-year and bank-year fixed effects. Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	$\Delta\_Credit$		
Measure of Underrep.:	UR_Loans	UR_Loans_10%	UR_Loans_I
Indep. variables:	(1)	(2)	(3)
$Bank\_CIRBE_{bit}$	0.157*** [0.020]	0.155*** [0.020]	0.152*** [0.019]
$Bank\_CIRBE_{bit} \times Underreporting_{it-1}$	-0.262*** [0.066]	-0.242*** [0.064]	-0.124*** [0.046]
Firm-Year FE	YES	YES	YES
Bank-Year FE	YES	YES	YES
Observations	194,413	194,413	194,413
R-squared	0.706	0.706	0.706

#### 4.5. PERSISTENCE

As an alternative way of exploring whether banks see through debt underreporting, we analyze the persistence of this practice over time. If most banks detect debt misstatements and deny credit to underreporting firms, we expect that underreporting does not persist too long over time (i.e., underreporting firms give up after one or two tries). Table 10 repeats the analysis in Table 3 including as additional regressors the lagged values of the dependent variable, namely  $Underreporting_{it-1}$  and  $Underreporting_{it-2}$ .<sup>20</sup>

**Table 10. Persistence of debt underreporting**

This table analyzes the persistence of underreporting over time. The dependent variables,  $UR\_Loans$ ,  $UR\_Loans_{10\%}$ , and  $UR\_Loans_I$  are as defined in Table 3.  $Underreporting_{it-1}$  and  $Underreporting_{it-2}$  are the first and second lag of the corresponding dependent variable, respectively.  $Firm\_Controls$  includes  $Firm\_Size$ ,  $Firm\_Equity$ ,  $Firm\_ROA$ , and  $Firm\_Age$  (defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	UR_Loans		UR_Loans_10%		UR_Loans_I	
Indep. variables:	(1)	(2)	(3)	(4)	(5)	(6)
$Underreporting_{it-1}$	0.230***	0.239***	0.223***	0.230***	0.144***	0.141***
	[0.023]	[0.030]	[0.023]	[0.030]	[0.023]	[0.030]
$Underreporting_{it-2}$		-0.031		-0.031		-0.051*
		[0.021]		[0.021]		[0.025]
<b>Firm Controls</b>	YES	YES	YES	YES	YES	YES
<b>Firm FE</b>	YES	YES	YES	YES	YES	YES
<b>Year FE</b>	YES	YES	YES	YES	YES	YES
<b>Observations</b>	2,203,679	1,699,851	2,203,679	1,699,851	2,203,679	1,699,851
<b>R-squared</b>	0.727	0.740	0.719	0.732	0.614	0.626

<sup>20</sup> We estimate an OLS regression adding lagged values of the dependent variable. Given the length of our panel and the low persistence of *Underreporting*, the inferences from this analysis are reliable (Wooldridge, 2002).

Table 10 reveals that the persistence of debt underreporting is relatively low. While the coefficient on  $Underreporting_{it-1}$  is positive and significant, the magnitude of this coefficient is relatively low (around 0.2), indicating that 80% of debt underreporting does not persist in the following period. Moreover, the coefficient on  $Underreporting_{it-2}$  is not statistically significant, which suggests that debt underreporting does not persist beyond one period. These results indicate that most firms do not engage in debt underreporting in a systematic way (i.e., period-after-period). Rather, the results in Table 10 suggest that firms resort to this practice occasionally and give up relatively quickly.

Taken together, the evidence in Tables 7 through 10 suggests that, on average, debt underreporting does not yield its expected result because banks see through it. Taken in isolation, the evidence of each of these tests is not enough to conclude that banks detect debt underreporting, but taken together, the evidence in Tables 7 through 10 is hard to reconcile with the notion that banks overlook this type of misreporting. As such, the results of these tables are consistent with prior literature highlighting the monitoring role of banks (e.g., Diamond 1984).

## 5. PAYMENT DEFAULTS

To further corroborate that the relatively lower debt amounts in firms' financial statements (compared to those in CIRBE) reflect misreporting, we next explore whether underreporting firms subsequently default in their payments. This analysis is based on the premise that the patterns documented in the previous sections (i.e., underreporters face financial difficulties (section 3) and do not obtain new credit (section 4)) likely result in underreporting firms eventually defaulting in their payments. We proceed in two steps. First, we explore whether underreporting firms delay payments to suppliers. Second, we examine whether these firms default on their loan repayments.

### 5.1. PAYMENTS TO SUPPLIERS

To analyze whether underreporting firms delay payments to suppliers, we re-estimate equation (3) using two alternative dependent variables.  $Payment\_Delay_{it}$  is an indicator variable that equals one if the firm  $i$ 's average payment period to its suppliers increases from year  $t-1$  to year  $t$ , and zero otherwise.  $\Delta\_Payment\_Period_{it}$  is the increase in the average payment period (in years) of firm  $i$  to its suppliers from year  $t-1$  to year  $t$ .



The results in Table 11 support the notion that underreporting firms subsequently delay payments to suppliers; *Underreporting* is positively associated with both *Payment\_Delay<sub>it</sub>* and  $\Delta\_Payment\_Period_{it}$ . These results are consistent with the evidence in Table 7 that underreporting is followed by a decrease in bank credit (Panel A) and an increase in non-bank liabilities (Panel B). That is, after being denied credit by banks, underreporting firms appear to resort to alternative sources of financing. Trade credit (i.e., delaying payments to suppliers) is one of them.

**Table 11. Payment to suppliers**

This table analyzes the association between underreporting and subsequent payments to suppliers. The dependent variables are: an indicator variable that equals one if there is an increase in the average payment period of firm *i* to its suppliers in year *t* as compared to year *t-1*, zero otherwise (*Payment\_Delay*) and the annual change in the average payment period (in years) to suppliers ( $\Delta\_Payment\_Period$ ). *Underreporting<sub>it-1</sub>* is one of three measures of underreporting, *UR\_Loans*, *UR\_Loans\_10%*, and *UR\_Loans\_I*, as defined in Appendix A and divided by 100 to minimize the number of decimal places in the coefficients. *Firm\_Controls* includes *Firm\_Size*, *Firm\_Equity*, *Firm\_ROA*, and *Firm\_Age* (defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Dep. variable:	Payment_Delay			$\Delta\_Payment\_Period$		
Measure of Underrep.:	UR_Loans	UR_Loans_10%	UR_Loans_I	UR_Loans	UR_Loans_10%	UR_Loans_I
Indep. Variables:	(1)	(3)	(5)	(2)	(4)	(6)
Underreporting <sub>it-1</sub>	0.066***	0.069***	0.014***	0.029***	0.031***	0.004***
	[0.009]	[0.009]	[0.003]	[0.005]	[0.004]	[0.001]
Firm Controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	1,677,824	1,677,824	1,677,824	1,677,824	1,677,824	1,677,824
R-squared	0.238	0.238	0.238	0.142	0.142	0.142

## 5.2. PAYMENTS TO BANKS

To analyze whether underreporting firms honor their payment commitments with banks, we re-estimate equation (3) using five alternative dependent variables.  $NPL_{it}$  is an indicator variable that equals one if at least one loan granted to firm  $i$  is non-performing as of December of year  $t$ , and zero otherwise (a loan is considered to be non-performing or “NPL” if the loan is more than 90 days overdue).  $NPL\_Recent_{it}$  is an indicator variable that equals one if at least one loan granted to firm  $i$  is non-performing as of December of year  $t$  and all loans were performing in year  $t-1$ , zero otherwise (that is,  $NPL\_Recent_{it} = 1$  if  $NPL_{it}=1$  and  $NPL_{it-1}=0$ , and zero otherwise).  $Chargeoff_{it}$  is an indicator variable that equals one if at least one loan granted to firm  $i$  is charged-off as of December of year  $t$ , and zero otherwise.  $Chargeoff\_Recent_{it}$  is an indicator variable that equals one if at least one loan granted to firm  $i$  is charged-off as of December of year  $t$  and there were no loans charged-off in year  $t-1$ , and zero otherwise.  $Insolvency_{it}$  is defined as one if firm  $i$  undergoes an insolvency procedure in year  $t$ , and zero otherwise. Data on non-performing loans and charge-offs is obtained from CIRBE. Information on whether the firm is undergoing an insolvency procedure is gathered from CB.

Table 12 presents the outcome of this test. The results show that debt underreporting is associated with a higher probability of financial distress. The firms engaging in this practice exhibit more subsequent overdue loans (also when these firms had no NPLs in the past), more charged-off loans (also when these firms had no charged-off loans in the past), and higher probability of being involved in an insolvency procedure. This evidence is consistent with the notion that, after being denied access to credit, underreporting firms end up entering financial distress. While they leverage on trade credit from suppliers, this additional financing is not enough to avoid financial difficulties.

**Table 12. Payment to banks**

This table analyzes the association between underreporting and subsequent bank payments. In Panel A,  $NPL$  is an indicator variable that equals one if the firm has non-performing loans or “NPL” (i.e., overdue by more than 90 days) in that year, and zero otherwise.  $NPL\_Recent$  is an indicator variable that equals one if the firm has NPL in that year but not in the prior year, and zero otherwise. In Panel B,  $Chargeoff$  is an indicator variable that equals one if the firm has loan charge-offs in that year, and zero otherwise.  $Chargeoff\_Recent$  is an indicator variable that equals one if the firm has charge-offs in that year but not in the prior year, and zero otherwise. In Panel C,  $Insolvency$  is an indicator variable that equals one if the firm is under insolvency proceedings in that year, and zero otherwise.  $Underreporting_{i,t-1}$  is one of three measures of underreporting,  $UR\_Loans$ ,  $UR\_Loans\_10\%$ , and  $UR\_Loans\_I$ , as defined in Appendix A and divided by 100 to minimize the number of decimal places in the coefficients.  $Firm\_Controls$  includes  $Firm\_Size$ ,  $Firm\_Equity$ ,  $Firm\_ROA$ , and  $Firm\_Age$  (defined as in Appendix A). Standard errors (in brackets) are clustered by firm and year. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level (two-tail) respectively.

Panel A. NPL						
Dep. variable:	NPL			NPL_Recent		
Measure of Underrep.:	UR_Loans	UR_Loans_10%	UR_Loans_I	UR_Loans	UR_Loans_10%	UR_Loans_I
Indep. Variables:	(1)	(3)	(5)	(2)	(4)	(6)
Underreporting <sub>it-1</sub>	0.030***	0.026***	0.010***	0.011***	0.011***	0.004***
	[0.004]	[0.004]	[0.001]	[0.002]	[0.002]	[0.001]
Firm controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	2,203,679	2,203,679	2,203,679	2,135,676	2,135,676	2,135,676
R-squared	0.584	0.584	0.584	0.310	0.310	0.310

Panel B. Charge-off						
Dep. variable:	Chargeoff			Chargeoff_Recent		
Measure of Underrep.:	UR_Loans	UR_Loans_10%	UR_Loans_I	UR_Loans	UR_Loans_10%	UR_Loans_I
Indep. Variables:	(1)	(3)	(5)	(2)	(4)	(6)
Underreporting <sub>it-1</sub>	0.022***	0.020***	0.008***	0.008***	0.007***	0.002***
	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.000]
Firm controls	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	2,203,679	2,203,679	2,203,679	2,189,870	2,189,870	2,189,870
R-squared	0.606	0.606	0.606	0.298	0.298	0.298

Panel C. Insolvency			
Dep. variable:	Insolvency		
Measure of Underrep.:	UR_Loans	UR_Loans_10%	UR_Loans_I
Indep. Variables:	(1)	(2)	(3)
Underreporting <sub>it-1</sub>	0.005***	0.005***	0.002***
	[0.001]	[0.001]	[0.000]
Firm controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	2,203,679	2,203,679	2,203,679
R-squared	0.688	0.688	0.688

## 6. ADDITIONAL DISCUSSION AND ANALYSES

### 6.1. POTENTIAL DATA ISSUES

One potential concern about our interpretation of prior results is that the differences between the credit amounts in CIRBE and the corresponding amounts in CB (i.e., in firms' balance sheets) are driven by differences between the two data sources in terms of coverage, time, accuracy, or accounting criteria. Before discussing these issues in detail, we note that the notion that the documented differences in credit amounts simply reflect measurement error is hard to reconcile with the empirical patterns in sections 3 through 5. In particular, it is unclear why data issues driving variation in *UR\_Loans* should be more prevalent among firms in need for additional funding (section 3), and why these issues are associated with banks' credit decisions (section 4) and with subsequent payment defaults (section 5). That being said, we next examine in detail each of these potential data issues.

Regarding coverage, one potential concern is that, prior to 2016, CIRBE was subject to the policy of not including exposures of less than 6,000 euros. Several consider-

ations suggest that this issue does not affect the conclusions of our analysis of debt underreporting. To begin, incomplete information at CIRBE cannot result in balance sheet amounts being lower than CIRBE amounts; if anything, it would explain the opposite pattern. Moreover, the policy of excluding small loans was eliminated in 2016 and, as shown in Online Appendix (Table OA.1), we also find similar patterns from 2016 onwards (i.e., when the coverage of CIRBE includes exposures of less than 6,000 euros). Moreover, consistent with Table 3, we also find empirical support for the hypothesized determinants of underreporting.<sup>21</sup> This suggests that the pre-2016 exclusion of small loans does not significantly affect the patterns we document.

The differences documented in Table 3 cannot be due to CIRBE and CB amounts being measured at different points in time. Banks must report monthly to CIRBE, which allows us to match the timing of the balance sheet amounts and the CIRBE amounts. To minimize measurement issues, we restrict our analysis to firms with fiscal year-end in December (this restriction imposes very little sample attrition). To mitigate the concern that banks and CIRBE might not be timely in recording loans or in removing loans that have matured, we also recompute our measures of underreporting using CIRBE data from January and March of year  $t+1$  (instead of data from December of year  $t$ ). As shown in the Online Appendix (Panels A and B of Figure OA.1. and Table OA.2), we obtain the same empirical patterns.

It is also unlikely that the differences documented in Table 3 respond to deficiencies in the quality/accuracy of our data. Our data sources -CIRBE and CB- are both verified by the Bank of Spain, as this information is an important input for bank supervision, regulation, and monetary policy. Moreover, to eliminate any remaining concerns about the quality of the information contained in the CB database, we leave out firms with only one year of data, observations labelled as “low-quality” by the Bank of Spain, and firms with a negative cash balance.<sup>22</sup>

We conduct two additional robustness tests to further mitigate any concerns on the quality of our data. In Online Appendix (Panel C of Figure OA.1 and Table OA.3),

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<sup>21</sup> The only exception is the coefficient associated to financial expenses over total liabilities, which is not statistically significant from 2016 onwards. This result might be a consequence of the low firms’ financing costs in a context of negative interest rates and expansionary monetary policy measures.

<sup>22</sup> In addition, we verified manually the quality of our data by comparing the information in CB with that in the original financial statements filed with the Spanish Commercial Registry and with the information collected by SABI (a database owned by Bureau Van Dijk that contains financial information on Spanish private firms).

we restrict the sample to firms that in a given year hold credit exclusively from the ten largest Spanish banks in terms of credit to non-financial firms during the sample period. To the extent that they have more resources, the reporting of these banks is likely to be more sophisticated and accurate. Moreover, in Online Appendix (Panel D of Figure OA.1 and Table OA.4), we exclude from the analysis firms that obtain credit in the last quarter of the fiscal year. We exclude these observations because it is possible that, in some cases, the credit recently obtained by these firms has still not been accounted for in these firms' financial statements. The results reported in these figures and tables suggest that our inferences are not sensitive to these modifications of our main analysis.

Finally, a difficulty to interpret our results would also arise if CIRBE and balance sheets amounts were produced using different accounting criteria. While this concern could apply to the classification of leasing contracts or to the valuation/recognition of sophisticated instruments, it does not apply to standard loans, which are accounted for at amortized cost both by banks reporting to CIRBE and by firms issuing financial statements.<sup>23</sup> Moreover, firms and banks must use the same mandatory format to report standard bank loans. We also note that most of the credit granted to our sample firms is in the form of standard loans (leasing amounts are comparatively small and debt securities and other more sophisticated debt vehicles are rare).<sup>24</sup> In sum, a difference in accounting criteria between the information in CIRBE and that in CB cannot explain the documented underreporting of standard loans.

## 6.2. ACCOUNTING MECHANISMS TO HIDE DEBT

Another natural question about debt underreporting is what is/are the offsetting account(s) to the amount of outstanding debt not reported in the balance sheet. To shed some light on the issue, we explore empirically the possibility that firms make up for the underreported debt by booking lower inventories. To have a sense of the

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<sup>23</sup> As in balance sheets, in CIRBE debt amounts include the total sum of outstanding principal, and interests and commissions due. It does not include accrued interests and commissions not due. In any case, the omission of these amounts would lead to bank debt overreporting, instead of underreporting.

<sup>24</sup> Spanish nonfinancial firms are rarely dependent on debt securities financing (Arce et al. (2021) document that only 94 non-financial companies issued a bond at any time between 2006 and 2015). Moreover, the securitization of commercial and industrial loans is very low (4.8 percent in 2006) (see Jiménez et al., 2014).

validity of this conjecture, we compute the correlation between the reported (ending) inventory amounts and a synthetic measure of the inventory account designed to filter out potential manipulation. This synthetic measure is computed as beginning inventory plus purchases minus sales. We compute this correlation separately for the subsample of observations with substantial debt underreporting ( $UR\_Total\_I=1$ ) and for the rest of observations ( $UR\_Total\_I=0$ ). We find that the correlation between reported inventories and synthetic inventories is substantially lower for debt-underreporting firms than for other firms ( $p$ -value  $< 0.001$ ).<sup>25</sup> While descriptive, this evidence is consistent with the notion that underreporters exercise more discretion in the valuation of inventories. That said, we concede that firms could hide debt using other accounting procedures. Unfortunately, a detailed empirical study of all possible accounting mechanisms to offset a lower reported level of debt is unfeasible; it would require access to firms' ledger accounts.

## 7. CONCLUSIONS

This paper documents that a significant number of private firms underreport debt obligations in their balance sheets. Our evidence is based on comprehensive data on the universe of loans reported by bank lenders to the public credit register of the Bank of Spain (called "CIRBE") combined with regulatory financial data on borrowers and lenders. We identify debt underreporting by comparing amounts reported in financial statements and the corresponding amounts reported by banks to the public credit registry. We observe that debt underreporting occurs in a non-negligible fraction of our sample. The misreported amounts are not negligible (5% of total assets).

We also analyze the determinants of debt underreporting. We find that underreporting is more frequent among unaudited firms applying for new credit at new banks (i.e., financial institutions with which they do not have a previous credit relationship). We also observe that debt underreporting is more frequent among firms with relatively more short-term bank debt and higher interest expenses.

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<sup>25</sup> The correlations for the observations with  $UR\_Total\_I=1$  ( $UR\_Total\_I=0$ ) is 0.40 and 0.33, respectively. Both correlations are statistically significant at the 1% level. The fact that these correlations are not close to 1 is not surprising. Our synthetic measure does not consider spoilage and measure changes in inventories based on sales, which are valued at selling price rather than at cost.

We also present a battery of tests whose combined evidence suggests that most banks see through debt underreporting. In the period subsequent to the misstatement, underreporters exhibit a relative decrease in bank debt and a relative increase in non-bank liabilities, a pattern that is not consistent with the notion that misreporting helps these firms access new credit from banks. Rather, these results suggest that the lack of bank financing forces an increase in trade credit (through a delay in the payments to suppliers). Also consistent with the idea that banks detect misreporting, we observe that banks more exposed to underreporting firms are subsequently less likely to provide credit to underreporters and that underreporting firms obtain a significantly lower amount of credit from banks that verify firms' creditworthiness in CIRBE. Finally, we document that underreporting persists only one period, which suggests that firms give up relatively soon on this reporting practice.

Our last set of tests explores whether underreporting firms subsequently delay (and default on) their payment obligations. We document that these firms delay payments to suppliers. We also observe that, following underreporting, firms are more likely to default on their bank payments (they exhibit higher levels of non-performing loans and charge-offs, and they are more likely to enter insolvency procedures).

Collectively, our results suggest that sharing credit information in a comprehensive public registry is instrumental in detecting debt misreporting. As such, our results beg the question of whether there is substantial undetected debt underreporting in countries that do not have public credit registries (in these countries banks report credit information to credit bureaus but the reporting is voluntary, which results in incomplete information about borrowers). The present situation in the U.S. is a notable example.

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## APPENDIX A: VARIABLE DEFINITIONS

Variable	Definition
<b>Difference_Total</b>	<i>Difference_Total</i> is the difference between the amount of outstanding total bank credit (i.e., loans and other types of credit) in CIRBE and the corresponding amount on the balance sheet, both scaled by total assets and expressed in %.
<b>UR_Total</b>	<i>Difference_Total</i> if <i>Difference_Total</i> > 0%, and zero otherwise.
<b>UR_Total_5%</b>	<i>Difference_Total</i> if <i>Difference_Total</i> ≥ 5%, and zero otherwise.
<b>UR_Total_10%</b>	<i>Difference_Total</i> if <i>Difference_Total</i> ≥ 10%, and zero otherwise.
<b>UR_Total_I</b>	Indicator variable that equals one if <i>Difference_Total</i> ≥ 10%, and zero otherwise.
<b>Difference_Loans</b>	<i>Difference_Loans</i> is the difference between the amount of outstanding (standard) loans in CIRBE and the corresponding amount on the balance sheet, both scaled by total assets and expressed in %.
<b>UR_Loans</b>	<i>Difference_Loans</i> if <i>Difference_Loans</i> > 0%, and zero otherwise.
<b>UR_Loans_5%</b>	<i>Difference_Loans</i> if <i>Difference_Loans</i> ≥ 5%, and zero otherwise.
<b>UR_Loans_10%</b>	<i>Difference_Loans</i> if <i>Difference_Loans</i> ≥ 10%, and zero otherwise.
<b>UR_Loans_I</b>	Indicator variable that equals one if <i>Difference_Loans</i> ≥ 10%, and zero otherwise.
<b>OR_Loans</b>	<i>Difference_Loans</i>   (i.e., the absolute value of <i>Difference_Loans</i> ) if <i>Difference_Loans</i> < 0, and zero otherwise.
<b>OR_Loans_10%</b>	<i>Difference_Loans</i>   (i.e., the absolute value of <i>Difference_Loans</i> ) if <i>Difference_Loans</i> ≤ -10%, and zero otherwise.
<b>OR_Loans_I</b>	Indicator variable that equals one if <i>Difference_Loans</i> ≤ -10%, and zero otherwise.
<b>Applications</b>	Indicator variable that is equal to one if firm <i>i</i> has applied for a loan to a bank at any time during year <i>t</i> , and zero otherwise.
<b>ST_Credit</b>	Firm's short-term bank debt over total liabilities.
<b>Financial_Exp</b>	Firm's financial expenses over total liabilities.
<b>Firm_Size</b>	Logarithm of firm total assets (in thousands of euros).
<b>Firm_Equity</b>	Firm equity over total assets.
<b>Firm_ROA</b>	Firm earnings before interest and taxes over total assets.
<b>Firm_Age</b>	Logarithm of (one plus) firm age in years.

<b>App_NewBanks</b>	Indicator variable that is equal to one if firm <i>i</i> has applied for a loan to a bank with which the firm <i>did not</i> have a previous relationship at any time during year <i>t</i> , and zero if firm <i>i</i> has received a loan from any bank with which the firm <i>had</i> a previous relationship at any time during year <i>t</i> .
<b>Log(1+NewBanks)</b>	Logarithm of (one plus) the number of banks without a previous relationship to which firm <i>i</i> has applied for a loan at any time during year <i>t</i> .
<b>Δ_Bank_Loans</b>	Change in the firm's outstanding amount of standard bank loans reported to CIRBE between year <i>t</i> and <i>t-1</i> scaled by total assets in year <i>t-1</i> .
<b>Δ_Bank_Total</b>	Change in the firm's outstanding amount of total bank debt reported to CIRBE between year <i>t</i> and <i>t-1</i> scaled by total assets at year <i>t-1</i> .
<b>Δ_Nonbank_Liabilities</b>	Change in the firm's outstanding amount of total liabilities (excluding total bank debt) between year <i>t</i> and <i>t-1</i> scaled by total assets at year <i>t-1</i> .
<b>Δ_Total_Liabilities</b>	Change in the firm's outstanding amount of total liabilities between year <i>t</i> and <i>t-1</i> scaled by total assets in year <i>t-1</i> .
<b>Bank_Size</b>	Logarithm of bank total assets.
<b>Bank_Equity</b>	Bank equity over total assets (in %).
<b>Bank_Liquidity</b>	Bank cash and cash equivalents over total assets (in %).
<b>Bank_Portfolio_NPL</b>	Ratio of NPL over total loans (in %).
<b>Bank_Portfolio_RE</b>	Volume of bank credit to construction and real estate over total assets (in %).
<b>Payment_Delay</b>	Indicator variable that is equal to one if there is an increase in the average payment period of firm <i>i</i> to its suppliers in year <i>t</i> as compared to year <i>t-1</i> , and zero otherwise.
<b>Δ_Payment_Period</b>	Increase in the average payment period (in years) of firm <i>i</i> to its suppliers in year <i>t</i> as compared to year <i>t-1</i> .
<b>NPL</b>	Indicator variable that is equal to one if according to CIRBE any loan of firm <i>i</i> is more than 90 days overdue as of December of year <i>t</i> , and zero otherwise.
<b>NPL_Recent</b>	Indicator variable that is equal to one if according to CIRBE any loan of firm <i>i</i> is more than 90 days overdue as of December of year <i>t</i> but none in year <i>t-1</i> , and zero otherwise.
<b>Chargeoff</b>	Indicator variable that is equal to one if according to CIRBE any loan of firm <i>i</i> is charged-off as of December of year <i>t</i> , and zero otherwise.
<b>Chargeoff_Recent</b>	Indicator variable that is equal to one if according to CIRBE any loan of firm <i>i</i> is charged-off as of December of year <i>t</i> but none in year <i>t-1</i> , and zero otherwise.
<b>Insolvency</b>	The firm <i>i</i> is under insolvency proceedings as of December of year <i>t</i> .

## APPENDIX B: SOURCES OF INFORMATION ABOUT FIRM CREDIT RISK

Across the world there are two types of institutions specialized in collecting credit information: public credit registries and private credit bureaus. The former are generally operated by a country's central bank and require mandatory information exchange from lenders. The latter are private arrangements that emerge when lenders exchange their data voluntarily.

Public credit registries (PCRs) do not exist in every country; major economies such as Canada, India, Japan, the U.K., and the U.S. have not established a mandatory information sharing mechanism. However, a number of countries in continental Europe (e.g., Austria, Belgium, Germany, France, Italy, Portugal, and Spain) have PCRs managed by the central bank. Credit registries are also common in South America, Africa, Asia, and Oceania (International Finance Corporation, 2012). Over the last decades, there has been a significant growth in the number of PCRs around the world. According to the World Bank's "2004 Doing Business Database on Public Credit Registries", the number of PCRs worldwide increased from 13 in 1964 to 57 in 2002. Beyond 2002, there have been a number of other milestones in the development of PCRs around the world.<sup>26</sup>

There are two types of private credit bureaus (PCBs); those set up by a coalition of lenders and those set up by third-party private companies. Prominent examples of the former include the Association of Banks in Singapore, as well as credit bureaus in Poland, Brazil, and Turkey (International Finance Corporation, 2012). Examples of the latter include Experian, Equifax, and TransUnion for consumer credit and Dun & Bradstreet (D&B) for corporate payments. The credit bureaus operated by private companies are for-profit and thus have incentives to innovate and specialize in detailed information and value-added services (e.g., credit scoring, portfolio monitoring, and fraud detection).

Because disclosure from lenders is mandatory, PCRs have the advantage of holding comprehensive information. However, the credit information contains limited detail

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<sup>26</sup> In 2003, the governors of central banks of several European countries signed a Memorandum of Understanding (MoU) for the cross-border exchange of information on borrowing. The Central Bank of Ireland established the Irish central credit register under the Credit Reporting Act of 2013. In 2016, the ECB launched the "AnaCredit" project, namely the creation of a cross-country registry containing detailed information on bank loans to firms in the euro area.



(PCRs generally present aggregate loan information). Furthermore, even when PCRs contain relatively sophisticated information such as debt exposure, they often set a minimum reporting threshold and only collect information for borrowers with outstanding debt above that threshold.

Several considerations suggest that PCBs are unlikely to contain comprehensive information on corporate debt. First, the formation of PCBs is subject to a collective action dilemma and is influenced by the degree of competition, asymmetric information in the credit market, and technology (Pagano and Jappelli, 1993).<sup>27</sup> Second, the cost of reporting incomplete or untruthful information to a PCR is higher than that of misreporting to a PCB (there is a legal mandate to report to PCRs). Third, oftentimes the information at PCBs relates to trade payment history (e.g., D&B's PAYDEX), not to outstanding debt (Kallberg and Udell, 2003). These issues suggest that it is difficult to identify debt underreporting by comparing the information in PCBs to that in firms' financial reports.

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<sup>27</sup> Critically, incumbent lenders that make up the credit bureau may block new members from joining or boycott the formation of new credit bureaus, essentially using exclusive information sharing arrangements as a barrier to entry. This creates a perverse market structure that discourages expanded coverage and competition. Jappelli and Pagano (2006) describe one such case in Mexico where a pre-existing credit bureau, (the Buró de Crédito) formed by the Mexican Bank Association, could successfully prevent the creation of two successive credit bureaus by embargoing their membership.

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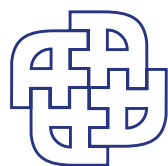
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