Government Arrears and Corporate Policies: Lessons from a Natural Experiment*

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Abstract

We study how late payment affects corporate policies by analyzing a government program that unexpectedly repaid public procurement arrears. Our identification strategy compares firms included in the program with similar firms that were accidentally excluded. The repayment of arrears leads to heterogeneous corporate responses. Financially constrained firms adjust real operations by increasing investment and repaying suppliers, while financially unconstrained firms change their financial structure by repaying debt. Both types of firms increase their cash reserves. Finally, the accumulation of arrears deteriorates procurement relationships, which do not recover after repayment.

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1 Introduction

Government procurement, i.e., the purchase of goods and services on behalf of a public authority, accounts for a substantial part of the global economy. According to the World Bank, public procurement in 2020 represented between 13% and 20% of world GDP, and global expenditure on procurement was close to 9.5 trillion US dollars.[1] Government contracts benefit firms by ensuring stable demand, which is especially crucial for small local businesses (Garcıa-Santana and Santamarıa, 2023), particularly during recessions when private-sector demand declines (Goldman, 2020). Yet, this stability comes at a cost, as governments are often slow in making payments. A recent study analyzing over 140 countries using World Bank data shows that government payments are frequently delayed, with procuring entities taking a staggering 100 days on average to process public contract payments.[2] These delays often stem from governments structuring procurement contracts with long formal payment periods. Moreover, the actual payment of procurement trade credit frequently extends beyond the contractual due date, resulting in late payment and the accumulation of arrears.[3]

Paying in arrears provides governments with flexibility, helping them manage liquidity needs and even generate positive spillovers for long-term financing (Benigni, 2024). However, arrears can also impose a significant financial burden on procuring firms and potentially disrupt their operations. Despite the widespread occurrence of late payment in procurement, its impact on firms' policies remains relatively unexplored. More broadly, late payment in trade credit is a common phenomenon—especially among financially constrained firms and larger firms (Giannetti et al., 2011). However, this issue has received limited attention in the academic literature.[4]

In this paper, we contribute to filling this gap by studying how firms manage the late payment of trade credit, particularly in the context of procurement contracts. To do so, we analyze a large-scale financing plan that unexpectedly repaid the accumulated arrears of local governments to their suppliers. Repayment was staggered across similar firms over two different years due to an administrative oversight, providing us with a natural experiment to explore its effects. Our results show that repayment significantly affects suppliers' corporate investment, leverage, and liquidity. However, firms exhibit heterogeneous responses depending on their level

[1] See https://www.worldbank.org/en/news/feature/2020/03/23.

[2] See https://blogs.worldbank.org/en/developmenttalk/efficient-public-procurement-comes-rescue.

[3] "Arrears can be formally defined as any unpaid and overdue debt. In this paper, we use the term in the specific context of trade credit to refer to supply contracts that are not yet paid by the agreed payment date. This definition follows the trade credit literature, where the concepts of late payment and arrears are often treated as equivalent"

[4] The use of late payment is not restricted to the public sector. In the private sector, Cuñat and Garcia-Appendini (2011) document that late payment is frequent. For example, in the US, it occurs 17% of the time for the most common trade credit contract (30 days), with an average additional late payment period of 53 days. The use of arrears in trade credit has been linked to the provision of liquidity from buyers to suppliers Cuñat (2007), Wilner (2001), which aligns with the interpretation in Benigni (2024) for the public sector.

of financial constraints. Financially constrained firms respond by adjusting their operations; specifically, by increasing investment and repaying their suppliers. In contrast, financially unconstrained firms primarily respond by reshaping their financial structures; in particular, by repaying financial debt. Both constrained and unconstrained firms build up their cash reserves as a buffer against potential late payment. A key insight of the paper is that this heterogeneous reaction of firms to the early repayment of arrears allows us to infer how firms initially manage late payment. While financially constrained firms seem to delay investment, deplete cash, and increase borrowing from their suppliers, financially unconstrained firms are able to borrow from banks and accommodate the effects of late payment. Further results also suggest that the accumulation of arrears harms procurement relationships, which do not recover even after repayment.

The cost that delayed public-sector payments impose on firms is a concern shared by regulators worldwide. For instance, the European Commission issued a Late Payment Directive (LPD) in 2011 to standardize payment terms, impose late payment penalties, and establish uniform regulations.[5] Similarly, in the US, states such as Illinois, New York, and Massachusetts enforce interest penalties on late payments for public projects to encourage prompt repayment and ease the financial strain that delayed payments can put on the private sector.[6] Although the establishment of penalties and late payment interest has incentivized on-time payment, state comptrollers still routinely report the late payment of procurement invoices. Similarly, in China, the accumulation of arrears by local governments and its impact on corporations remains a significant issue and a topic of ongoing national debate.[7]

The main empirical challenge is that the use of arrears is often influenced by the specific circumstances of both the buyer and the seller, creating a standard endogeneity problem. To address this problem, an ideal research design would involve unexpectedly repaying government arrears for a random subset of firms. We take advantage of a natural experiment that mimics this ideal field experiment. In 2012, the Spanish government unexpectedly repaid nearly €30 billion in overdue regional government arrears to approximately 135,000 suppliers—an unanticipated cash injection for these firms.[8] However, the program accidentally excluded a group of firms.

[5]This directive mandates that payments from governments to businesses not completed within 30 days must allow creditors to claim interest and recovery costs. See Directive 2011/7/EU, On Combating Late Payment in Commercial Transactions, 2011 O.J. [L. 48], 2 for more details.

[6]This trend of requiring interest on unpaid bills has expanded to other states. For example, Louisiana Governor John Bel Edwards enacted Act No. 566 on May 30, 2018. This update to the Louisiana Revised Statute Section 38:2191(B), effective August 1, 2018, mandates that public entities pay interest on late payment. According to the amendment, payments are considered late, and interest begins to accrue 45 days after the public entity receives a proper request for payment. The interest rate is set at 0.5% daily and is capped at 15%.

[7]See https://www.yicaiglobal.com/news/china-urges-local-governments-soes-to-solve-issue-of-outstanding-corporate-debts.

[8]News coverage of the repayment program first appeared in mid-January 2012. Legislation was passed in March, and the payments were made between May and July. See Figure IA.1 in the Online Appendix for details on the news coverage.

This omission was due to a legal oversight that failed to include those firms that had contracts with groups of municipalities, known as *mancomunidades*. The excluded firms eventually received payment in 2013. Both groups of firms were comparable in their characteristics before 2012. The unexpected nature of the program and the existence of a naturally exogenous control group make this liquidity injection an ideal setting to study the effects of repaying accumulated arrears.

Our first set of results show that the accelerated payment of government arrears has real effects. The repayment program affected corporate investment, leverage, and liquidity policies. In particular, we find that an unexpected repayment shock equivalent to more than 10% of a firm's assets leads firms to increase their investments by 11%, reduce their leverage by 13%, and increase their cash reserves by 40%. These effects are both statistically and economically important, representing approximately 25%, 30%, and 37% of one standard deviation of firm investment, leverage, and liquidity growth, respectively.

In our main set of results, we simultaneously exploit the natural control group and the intensity of the treatment. One would expect that the link between the repayment of arrears and real effects should be stronger the greater the amount repaid. We measure the intensity of the treatment by grouping treated firms into four categories based on the repayment-to-total-assets ratio (cutoffs at 1%, 5%, and 10%). The results show a monotonic firm response to the repayment shock intensity, which reinforces the validity of our results and our identification strategy. The consequences of this program provide valuable insights into the effects of reducing government arrears and injecting liquidity into firms.

Conceptually, late payment in trade credit should not substantially affect firms' actions if they can access liquidity. This suggests that late payment becomes relevant only when financial frictions are present. In developed economies, government late payment carries minimal default risk, ensuring that suppliers eventually get paid. Given this low risk, firms in a frictionless financial market should be unaffected by late payment, as they can borrow against public invoices using them as collateral in factoring contracts with banks. However, when financial frictions exist, these delays can still affect firms' corporate policies. Regulatory frictions and banks' liquidity constraints limit the ability of banks to engage in factoring contracts. Moreover, factoring activity varies across banks. We show that, in our sample period, banks in a stronger financial position expanded their factoring activity relative to those that were more constrained. Better-capitalized banks may also have been able to extend other forms of credit to their customers to help them accommodate the liquidity needs induced by the accumulation of public arrears.

We proxy financial constraints using firms' predetermined exposure to specific banks that were more or less affected by the crisis (see Chodorow-Reich (2014), Jimenez et al. (2014), and Bentolila et al. (2018) for a similar approach). The results show that financially constrained

firms increase their investment after the liquidity injection while reducing accounts payable. This implies that receiving trade credit may act as a substitute for bank financing but remains insufficient to prevent investment declines. It also highlights how government arrears can be transmitted through the supply chain via trade credit. These findings suggest that constrained firms had previously delayed investment opportunities, underscoring how large government arrears can disrupt real operations. Conversely, financially unconstrained firms do not increase their investments after the repayment program but instead reduce financial debt. This suggests that these firms were able to borrow against their accounts receivable, other forms of collateral, or future cash flows. Finally, firms in both groups raise cash reserves, either to restore depleted funds or as a safeguard against potential late payment.[9]

Finally, we study how the repayment of accumulated government arrears affects the relationship dynamics between firms and public administrations. We report the results of specifications using contract-specific information at the firm-municipality pair level, allowing us to control for unobserved within firm-year and municipality-year effects. Our findings indicate that when a public administration delays payments to a specific supplier, the supplier reduces public procurement contracting with that administration relative to others. This effect is significant in both the probability and size of contracting. These results suggest a deterioration in the relationship, negatively affecting the decision to establish new contracts between a firm and its public customers. Once late payment ceases, the commercial relationship does not deteriorate further, but the lost links due to arrears do not recover.

Our study is linked to several strands of the literature. First, we contribute to the literature on the financial aspects of procurement. Procurement provides firms with a stable income during recessions (Goldman, 2020). Lee (2021) finds that firms particularly dependent on procurement tend to grow more, especially financially constrained firms. Di Giovanni et al. (2022) and Gabriel (2022) expand on this idea by showing how firms use their procurement relationships as collateral to ease financing constraints. These studies highlight the various benefits of procurement for firms. However, Bonfim et al. (2021) show that when government spending is unexpectedly cut during a financial crisis, procurement-focused firms find it harder to borrow. In our paper, we also examine the negative effects of procurement, but we focus specifically on the consequences of late payment.

This paper also contributes to the trade credit literature. While the late payment of trade credit has been well documented in the literature (Petersen and Rajan, 1994; Cuñat and Garcia-Appendini, 2011), there are still relatively few contributions that examine its determinants and its consequences for firms. The theoretical literature focuses on its role as insurance for

[9]We provide complementary evidence by departing from our natural experiment and focusing on the period of arrears accumulation. We compare firms with accumulated arrears to a matched sample of firms without them. The results of this exercise align with the findings of our main analysis and corroborate our results with a completely different research design.

buyers with whom suppliers have specific relationships (Cuñat, 2007; Wilner, 2001). This may occasionally be relevant to procurement contracts, where suppliers are often specialized and maintain close commercial relationships. Benigni (2024) shows that, in aggregate, the ability to pay in arrears to a large population of suppliers can provide liquidity to governments, with substantial spillover effects on sovereign debt rates. The empirical literature on late payment remains limited. Giannetti et al. (2011) show that late payment is more common not only among financially constrained firms but also among larger firms with greater bargaining power over suppliers. This latter effect is particularly relevant in public procurement, where buyers often dictate payment terms. Our paper contributes by examining the potential costs suppliers incur when financing a large buyer through trade credit (Giannetti et al., 2021; Klapper et al., 2012; Murfin and Hjorge, 2015), focusing specifically on the costs of late payment. We further investigate how late payment affects supply chain relationships and the key role of financing constraints (Ersahin et al., 2024; Giannetti, 2024). We also contribute to the scarce literature on trade credit factoring by implicitly showing that firms cannot discount government arrears, even when the government's creditworthiness is strong.[10]

Several other papers have analyzed different aspects of trade credit and procurement. Checherita-Westphal et al. (2016) show that increased delays in some European governments' payments can affect the liquidity and profitability of the private sector, whereas Conti et al. (2021) find that stricter regulations aimed at minimizing late payments reduce firms' exit rates. Barrot and Nanda (2020) abstract from late payment and focus directly on the formal trade credit terms in procurement contracts. They show that imposing shorter formal payment periods can have a positive effect on firms. In particular, they find that shortening the formal trade credit period for U.S. government contractors positively impacted employment, though only in labor markets that were not too tight. We study government arrears (i.e., late payments) rather than the formal trade credit terms of procurement (i.e., contractual maturity). Our natural experiment examines a large one-time reduction in arrears, in contrast to Barrot and Nanda (2020), which analyzes a smaller but more persistent change. Additionally, we focus on the interaction between late payment and financing constraints.

Finally, our paper contributes to the literature on various stimulus policies used to channel liquidity to the corporate sector (Lelarge et al., 2010; Banerjee and Duflo, 2014; Brown and Earle, 2017). The impact of any targeted policy is typically difficult to evaluate due to potential selection biases. We contribute to this literature by analyzing a natural experiment in which an administrative oversight provides us with a reliable control group. We also analyze an unorthodox form of fiscal policy in which the government borrows from banks to accelerate the repayment of accumulated arrears. Although government liabilities remain unchanged, this policy has real effects, particularly for financially constrained firms.

[10] See Smith and Schnucker (1994) for one of the few contributions to understanding factoring contracts.

The rest of the paper is organized as follows. In Section 2, we provide an analytical framework and background information on the institutional setting for the repayment program. Section 3 describes the data. The empirical strategy and results are presented in Section 4. Section 5 discusses the role of financing frictions. Section 6 examines the effects of late payments by public entities on procurement contracts. Section 7 concludes.

2 Institutional setting

In this section, we describe the procurement process and lay out the natural experiment that we use for identification purposes.

2.1 Analytical background

From the perspective of the balance sheet of a supplier firm, government arrears can be characterized as an illiquid asset with uncertain maturity. In principle, if suppliers are paid with such illiquid assets, it could lead them to liquidity constraints, potentially affecting the firm's ability to invest or continue operations.

However, late payment in procurement contracts should not significantly impact firms' decision-making, provided that firms can use arrears as collateral. Arrears can mechanically create liquidity by offering a viable means to obtain loans. Factoring contracts are the most common way for firms to borrow using invoices as collateral. If government arrears are perceived as safe assets, firms may leverage them against future cash flows from their procurement contracts, thus mitigating the effects of delayed payments. In Spain, as in most developed countries, procurement trade credit contracts with municipal and regional authorities are implicitly guaranteed by the central government, suggesting that, barring financing constraints, procurement invoices should effectively generate sufficient collateral to offset any late payment.

The first empirical question of this paper aims to evaluate if this holds true. Specifically, we examine whether the anticipated repayment of government arrears produces tangible effects. The unconventional fiscal policy that we use as a natural experiment replaces one illiquid asset (arrears) with a liquid one (cash) in the balance sheet of supplier firms. In principle, if arrears generate their own collateral and liquidity, this fiscal policy should have no effects. However, our results suggest that this is not the case. Despite their "safe" label, arrears are an imperfect form of collateral, and factoring contracts or other types of financing are not adequately protecting firms against illiquidity. In the next section, we provide some arguments explaining why this may be the case.

Figure 1 conceptualizes this setting. The gray arrows show the flow of funds and contracts of the different agents, while the blue and green arrows show the flows of the unconventional fiscal policy of the government. Note that from the joint perspective of the entire government

(central, local, and regional), a liability with firms is replaced with a liability with banks. So, this policy does not entail any additional liabilities for the government as a whole. However, we show empirically that this policy has real effects.

Another empirical question is whether financially constrained and unconstrained firms have a different reaction to government arrears. Even if arrears are an imperfect form of collateral, they should not affect firms that are financially unconstrained in a broader sense. Specifically, firms can offset the liquidity constraints imposed by government arrears if they have access to alternative forms of collateral, generate sufficient cash flows, or leverage their commercial relationship with the government. If financially unconstrained firms borrow during the accumulation of arrears to keep investment at its optimal levels, their early repayment will entail a reduction of leverage and an accumulation of liquid assets. Conversely, financially constrained firms facing government arrears would use all their available liquidity, reduce investment, and distort their decisions to reduce their needs for liquidity. The firms that had to postpone investment due to illiquidity problems should increase investment after the repayment.[11]

To answer these two empirical questions, we take advantage of an empirical setting in which several key elements converge: i) an accumulation of procurement arrears; ii) a policy that repays these arrears unexpectedly; iii) groups of comparable treatment and control firms; and iv) a good measure of firms' financial constraints. These elements are all present in our empirical design which we describe in more detail in the next sections.

2.2 Trends in public procurement and arrears

The Spanish economy suffered a severe credit crunch that originated from the global financial crisis that developed in 2008 (Bentolila et al. 2018; Jimenez et al. 2014). The financial crisis had a considerable impact on the private sector, leading to higher unemployment and depressed domestic demand (Campos and Reggio, 2015). The public sector was also affected. Spain's public administrations, particularly at the municipal and regional level, experienced capital market funding problems, just like local banks, and they delayed payments to suppliers.[12]

During this period, municipalities increased total expenditures, exacerbating budget deficits (see Figure IA.3 in the Appendix). The result was that the commercial debt in arrears accumulated by regional and local governments at the end of 2011 amounted almost to €30 billion (about 3% of GDP). To get a sense of the severity of late payment by 2011, 35% of total municipal outstanding trade credit was overdue by more than 12 months, 16% by more than 24

[11] A similar argument about the differential response of constrained and unconstrained firms in the face of a positive liquidity shock can be found in Banerjee and Duflo (2014)

[12] Trade credit maturities were generally extended during this period, but the effect was more pronounced in the public sector. Figure IA.2 compares the evolution of average delayed payment days in the private and public sectors.

months, and 9% by more than 36 months.

Simultaneously, the financial crisis created a contraction of the factoring market. The factoring market allows firms to borrow in anticipation of payment of invoices by selling them to banks at some discount. Banks often have the right to recourse to the seller if the invoice is not paid. The factoring contract is, therefore, a loan in which the invoices serve as a form of collateral, with the discount implicitly determining the interest. Figure 2 compares the evolution of sales (turnover index) with the evolution of factoring loans for the whole economy. While sales declined by 19% between 2007 and 2012, factoring loans as a fraction of GDP fell by 58%. During this period, the prevalence and maturity of trade credit increased, so the fraction of invoices that were being factored shrank even further than 58%. All this evidence, together with a context in which firms had an increased demand for liquidity, suggests that the sizable reduction in factoring was largely driven by supply factors. Some of the reasons that may have induced factoring to shrink are regulatory. Despite the explicit guarantees of the central government, the European banking regulations did not consider factoring regional government invoices as a safe form of lending. Municipal and local government arrears require more regulatory capital than other forms of loans. Also, banks were not able to re-discount the arrears at the European Central Bank during this period. Facing limited lending capacity, banks shifted their focus to alternative forms of lending, such as sovereign lending (Acharya et al., 2018; Ongena et al., 2019).

2.3 An unconventional fiscal stimulus

The Spanish central government approved the *Plan de Pago a Proveedores* or *Supplier Payment Program* (SPP) to alleviate these liquidity problems of suppliers to regional and local governments. The program established a new state-owned vehicle, the FFPS (Fund for Financing Payments to Suppliers), in March 2012. The FFPS borrowed €30 billion via a syndicated loan with most of the Spanish banks. The state guaranteed the loan and the liabilities of the FFPS became part of the central government debt. The FFPS then made payments directly to the suppliers of regional and local governments that held arrears dated before 2012. The FFPS was announced in mid-January 2012, and the repayment occurred between May and July 2012.

In exchange of their debts being repaid, regional and local governments owed the Spanish Treasury under favorable conditions. Their funding was guaranteed by their respective shares in the pool of state tax receipts. Panel B of Figure IA.3 in the Appendix shows how the financial situation of municipalities deteriorated from 2008 to 2011 but improved after the central government intervention.

This was an unconventional form of fiscal policy. As Figure 1 shows, all the agents involved substituted an asset for an asset or a liability for a liability. The FFPS did not mean additional liabilities were incurred by local governments. Rather, the central government borrowed directly

from banks what was needed to pay local government debts. Local governments were thus released from their debts with suppliers while acquiring debt with the central government. Firms substituted one asset (invoices) for another asset (cash), as a way to overcome the firms' inability to borrow via factoring. While the implicit guarantee of the central government may not have been enough to allow firms to factor their arrears, the explicit borrowing of the central government provided them with liquidity.

2.4 The natural experiment

To estimate the causal effect of the accelerated repayment of government arrears, we take advantage of an administrative mistake that left some firms out of the initial phase of the plan.

Spanish municipalities may channel some or all of their purchases through *mancomunidades*. These are legal pools of several municipalities engaged in procurement that seek to achieve some economies of scale and improve their bargaining power. Although from an economic standpoint, municipalities and *mancomunidades* are very similar, they have different legal statuses. The first phase of legislation accidentally did not specify that debts with *mancomunidades* were included in the program, so their debts were not paid in 2012. In February 2013, another law was passed, resulting in a new round of the FFPS that paid the arrears to the suppliers of *mancomunidades*. We label the firms that were paid in the initial round as Phase I firms and those paid in the second round as Phase II firms.

The important fact for our analysis is that the reason why some firms were only paid in Phase II was due to an error in the plan's original legislation (i.e., it did not include *mancomunidades*) that was unrelated to the characteristics of the suppliers. Firms in Phase I and firms in Phase II have similar exposure to the public sector and public arrears; they are also very similar in characteristics. This is the basis of our identification strategy. We use the FFPS as a random shock that affected treated firms in 2012 (Phase I firms), but that did not affect control firms, i.e., a quasi-randomly selected group of firms with similar characteristics (Phase II firms).[13]

3 Data

In this section, we describe the data used in this study. First, we elaborate on the data collection process and data sources and then provide summary statistics.

[13]Figure IA.4 provides an example of water treatment procurement in the region of Andalucia. Some municipalities contract directly for water treatment, while others do so via *mancomunidades*. There are no major selection margins between the two groups. More importantly, the firms that supply *mancomunidades* and municipalities are very similar; indeed, often, firms supply both municipalities and *mancomunidades*. In our main analysis, we use firms that participate only in Phase I as the treatment group (e.g., Firm A in the figure) and firms that participate only in Phase II as the control group (e.g., Firm B in the figure). Note that we drop any firms that appeared in both Phase I and Phase II (e.g., Firm C in Figure IA.4).

3.1 Data sources

The main data for our analysis are provided by the ICO. They include anonymous firm information from different phases of the FFPS. The data set includes information on each unpaid bill between a firm and each regional and local government, including amounts and payment dates. The data are matched by the ICO to exhaustive firm-level financial data from the Iberian Balance Sheet Analysis System (SABI).[14] For Phase I, the firms in the sample (i.e., those that can be matched to SABI) account for 48.2% of all suppliers (64,879 of 134,568) and almost 70% of the funds injected (€19 billion of €27.3 billion). For Phase II, the ICO data set includes about 5,000 suppliers; we match 1,848 firms, of which 1,201 are firms that also had earlier received funds in Phase I, and 647 are firms that received funds only in Phase II. Once we restrict ourselves to firms with non-missing information for all the relevant variables, our final sample has 47,735 firms for Phase I and 526 firms for Phase II.

For the section on public procurement contracts, we use the Opentender database that is matched to the ICO's data. Opentender includes public procurement information on contractors, public customer identifiers, and contract descriptions, including prices and amounts.

We obtain accounting information on municipalities and regions from the Spanish Finance Ministry database. Data on the business turnover index and factoring (unpaid bills of exchange) come from the Spanish Statistical Office. Finally, we measure the media coverage of Phase I and Phase II using Factiva, which aims to cover the universe of news in Spain.

3.2 Summary statistics

Table 1 presents summary statistics for firms in Phase I (column 1) and Phase II (column 2) in 2011, just before the announcement of the SPP. We aggregate all the unpaid invoices with all local and regional governments to calculate the total amount of arrears that each firm has. As it was done in the program's payments, we net out from these arrears any debts that firms had with the central government. The result is the effective repayment transferred from ICO to the firm. The average repayment shock for firms in Phase I is €142,360, compared to €102,105 for firms in Phase II.

On average, we do not observe any significant differences in the averages of variables across firms in Phase I and firms in Phase II. Firms in Phase I had average total assets of over €5 million and average total liabilities of over €3 million. Firms in Phase II had average total assets of more than €6.7 million and average total liabilities of over €4.5 million. As for cash, firms in Phase I and Phase II had about €280,000 and €270,000, respectively.[15]

[14] SABI data are provided by INFORMA D&B in collaboration with Bureau Van Dijk, which obtains financial information from the Spanish business register. SABI covers the vast majority of companies that are incorporated in Spain but does not cover some very small companies or self-employed individuals.

[15] In Table IA.1, we show aggregate descriptive statistics for the entire sample period.

The two groups of firms are comparable. Nevertheless, in Table IA.2, we match firms in Phase II to firms in Phase I using an entropy balancing matching technique (Hainmueller, 2012) on the first moment of the repayment shock and total assets. After matching, we can see that the differences between firm characteristics become even smaller, and there are still no significant differences between the two groups. We use this same matching strategy in parts of the analysis.

4 Accelerated repayment and corporate policies

We are interested in analyzing the effect of late payment of procurement contracts. In particular, we aim to understand whether corporate investments, leverage, and cash holdings are affected by an accelerated repayment of arrears.

4.1 Empirical strategy

To assess the causal impact of an accelerated repayment of government arrears, we require a treatment group that experiences an unexpected repayment of these arrears and a control group that, despite having similar characteristics and a similar amount of late payment, does not get repaid at the same time. We mirror the ideal randomized experiment by taking advantage of the random distribution of the repayment plan's implementation, as described above. The legislative oversight in 2012 effectively created two groups of municipalities that paid at different times to a similar group of firms.

Our underlying assumption is that the only difference between firms in Phase I and Phase II is that the former received repayment in mid-2012, while the latter received it a year later, in August 2013. We test empirically the validity of this assumption. Moreover, we also use entropy matching and synthetic control techniques to further improve the balance of both groups of firms.

Our initial specification is as follows:

$$y_{jt} = \gamma Treated_j + \beta(Treated_j \times Year_{2012}) + \Lambda + \varepsilon_{jt} \tag{1}$$

where y_{jt} represents corporate policies such as investment, leverage growth, and liquidity growth for firm j in year t. These variables are defined as the first difference of the logarithm of fixed assets, total liabilities, and cash, respectively, allowing for the interpretation of the coefficients in terms of net investment, changes in total liabilities, and changes in cash. $Treated_j$ is a dummy variable indicating firms in Phase I (value one) or Phase II (value zero). $Year_{2012}$ is a dummy variable that takes a value of one for 2012 and a value of zero for 2009-2011. We include a vector of fixed effects (Λ) that interacts indicator variables for *year*, *sector*, and *region*.

The coefficient of interest, β, measures the impact of the accelerated repayment of arrears on corporate policies for the treated firms (Phase I) relative to the control group of firms (Phase II). In particular, we compare the corporate policies of firms in Phase I and Phase II in the period before (2009–2011) with the year of the repayment shock (2012). [16]

In our main analysis, we build on the previous specification to exploit the heterogeneity in the treatment. Specifically, we sort the firms in Phase I into four groups based on the ratio of repayment to total assets, using cutoffs at 1%, 5%, and 10%. We expect a monotonic response from firms according to the intensity of the repayment shock.

We use entropy balancing to construct a different control group for each of the four subgroups of Phase I firms. Each control group reweighs the whole sample of Phase II firms to match the first moment of the repayment shock and total assets (both in levels). This allows for a direct comparison of firms that receive a repayment shock in Phase I and Phase II firms of a similar size and late payment levels that experience the repayment shock a year later. As in the previous specification, all the results include *year*, *industry*, and *region* fixed effects, with standard errors clustered at the firm level. As alternative specifications, we also incorporate firm fixed effects to control for unobserved heterogeneity and employ a synthetic difference-in-differences approach that is robust against potential deviations from the parallel trends assumption.

4.2 Results: Investment, leverage, and liquidity policies

We first analyze the impact of the central government's repayment of arrears on various corporate policies (investment, leverage growth, and liquidity growth). We exploit the plan's random repayment schedule using the structure outlined in Equation 1.

Table 2 reports the main effects of the repayment shock on investment, leverage growth, and liquidity growth. Columns 1, 3, and 5 include year, industry, and region fixed effects to control for time-specific shocks and unobserved time-invariant heterogeneity across different industries and regions. In columns 2, 4, and 6, we include a triple interaction of year, industry, and region fixed effects to control for time-varying sector-regional heterogeneity. We cluster standard errors at the firm level to account for potential within-firm correlation or heteroscedasticity.[17]

We observe significantly higher levels of investment and increases in cash holdings for the treated firms in the year of the repayment shock. On average, treated firms increase investment by about 5% and increase cash holdings by about 13% compared to the control group. We do not observe significant differences in leverage growth in 2012.

[16] The estimated magnitude should be considered a lower bound if some firms in Phase II anticipated repayment in 2013 and thus were preemptively able to shape their corporate policies in 2012.

[17] In this Section, we drop firms in Phase I with arrears under 0.17% of their assets (bottom quartile) to assure that the treated group has an economically meaningful level of arrears.

Table 1 shows that treatment and control groups are closely comparable. Yet, to further reduce any potential differences between both groups before 2012, we implement an entropy-balancing matching approach. This method reweighs the two groups according to the size of the repayment shock and total assets in 2011. Table IA.3 shows that the results remain similar after applying entropy matching, corroborating the findings in Table 1 that both groups are closely comparable and that investment and liquidity growth increase after the repayment shock.

In Table 3, we decompose the period before the shock into different years. The *treated* coefficient measures the differences between treatment and control firms in 2011, which is the omitted interaction and the year that we use as the baseline. The interaction of *treated* with the 2012 dummy measures the same effect as in Table 2, although it is now measured only with respect to the baseline year of 2011. The results are quantitatively similar across both tables.

The coefficients of the interactions between *treated* and the 2010 and 2009 dummies as well as the coefficient on *treated* can be seen as a test of the parallel trends assumption. We show that firms in Phase I and Phase II exhibit a similar pattern in terms of investment, leverage, and liquidity growth for the period 2009–2011.[18]

4.3 Treatment intensity

These tests aggregate all firms with arrears and provide an "overall effect" of repayment. This approach, though, gives equal weight to firms that receive minor repayments and those that receive larger ones. However, for firms with smaller arrears, the timing of repayment in 2012 or 2013 should not significantly affect corporate policies. The diversity in the size of the repayment shock across firms might contribute to the mildly significant outcomes in Table 2. In this section, the main specification of the paper uses the difference between Phase I and Phase II firms across different treatment intensities to identify the effects. When interpreting the results, we focus on the sign of the effects but also on the monotonicity of the effect across treatment intensities.

To account for the heterogeneity in the size of the repayment shock, we group firms according to the amount of arrears repaid. We sort the firms in Phase I into four different groups according to the amount of cash over the total assets with thresholds of 1%, 5%, and 10%. For each group of Phase I firms we construct a reweighted control group of Phase II firms to match the average assets and repayment shock. We expect stronger results for firms with higher repayment shocks. The lowest group also serves as a placebo test to confirm that the different reactions from firms in Phase I and Phase II are indeed due to the accelerated repayment, as the repayment should not change firm policies in a substantial way.

First, we assess firms' responses in terms of investment. The results are presented in Panel A of Table 4. The results show that treated firms increase investment relative to non-treated

[18]We report matched results in Table IA.4. Results are qualitatively similar. Again, we do not observe significant differences between firms in Phase I and firms in Phase II before 2012.

firms. The effect is monotonically increasing with the level of the repayment shock. The results are consistent with the hypothesis that firms exposed to late payment might have forgone investment opportunities and reacted by increasing investments upon receiving the repayment shock. The results also imply a certain degree of financing constraints affecting the firms in the sample and are inconsistent with the view that government arrears can always be used as a reliable source of collateral. We find a clear, monotonic relation between the size of the repayment shock and the firm investment response. Firms experiencing the most substantial repayment shocks (those above 10% of their total assets) show a significant 11.4% increase in investments relative to their Phase II counterparts. Table IA.1 indicates this increase in investment is economically important, as it represents about 25% (0.114/0.47 = 0.25) of a standard deviation of the investment growth of the firms in our sample.

Next, we study the impact of a repayment shock on corporate leverage. Panel B of Table 4 shows that firms significantly reduce leverage upon receiving a repayment shock that amounts to above 10% of their total assets. Treated firms reduce their leverage growth by about 13% compared to firms in Phase II. In economic terms, this reduction represents about 30% (0.13/0.44 = 0.30) of the standard deviation of changes in leverage during our sample period. These results suggest that when firms receive an unexpected injection of liquidity, they use these funds to pay off their outstanding liabilities, which would not only reduce their debt burden but also improve their financial health. The repayment is especially pronounced for firms that have substantial arrears, as they receive a greater positive repayment shock, enabling them to reduce their leverage.

Lastly, we study the impact on cash accumulation and present the results in Panel C of Table 4. We find a positive, monotonic relation between the size of the liquidity injection and the increase in cash holdings after repayment. Firms experiencing the most substantial repayment shocks (again, those above 10% of their total assets) keep about 40% more cash than Phase II firms. This increase is economically meaningful. Given the distribution of changes in repayment by firms in our sample, the increase in cash represents about 37% (0.40/1.08 = 0.37) of the standard deviation. As expected, the cash accumulation is particularly evident in firms receiving a greater repayment shock, as they consequently have more funds to retain.

This result implies that firms use the repayment shock not just for investment and to reduce leverage but also for cash accumulation. This increase in cash holdings is consistent with firms keeping some precautionary savings, either as a buffer that protects them against financial distress or to gain more flexibility in their future operational and strategic decisions.

Overall, this set of results shows that the intensity of the positive repayment shock affects the firm response. The response is monotonically increasing in the level of the shock across all three specifications, which is consistent with our identification strategy. In the next set of analyses, we propose complementary specifications to show the robustness of this group of

results.

4.4 Alternative specifications

We introduce two further specifications. A specification with firm fixed effects where we control for the potential impact of the firm's unobserved heterogeneity and a synthetic difference-in-differences specification that is robust to some violations of the parallel trends assumption.

In Table 5, we estimate a specification like Equation 1, but we add firm fixed effects. We include *year* × *industry* × *region* and *firm* fixed effects. This enhances the robustness and precision of the regression estimates by controlling for unobserved, time-invariant heterogeneity among firms and mitigates potential omitted variable bias.

Panel A of Table 5 shows the effect on firm investment policies. The results in Panel A of Table 4 are confirmed. In particular, as the extent of the repayment shock increases (from below 1% to above 10% of total assets), we observe a monotonic increase in the effect on investment. The impact is most significant for firms that receive a repayment shock greater than 10% of their total assets, increasing investment by approximately 8% on average.

Panel B evaluates the effect of repayment shocks on leverage. Here, we see that only firms receiving a large repayment shock (greater than 10% of their total assets) show a significant reduction of 15% on average in their leverage. This effect is highly statistically significant at the 1% level. These results are in line with the findings in Panel B of Table 4.

Panel C investigates the relation between the amount of the repayment shock and liquidity. Here, we see a significant effect for firms receiving repayment shocks amounting to more than 5% of their total assets. Again, the effect is strongest for firms with a repayment shock above 10% of their assets. In economic terms, these firms increase their cash holdings by more than 42%. The results are in line with those described in Panel C of Table 4.

Taken together, these results provide strong evidence that larger repayment shocks lead to more significant changes in corporate policies. All the point estimates are monotonically linked to the size of the shock, and the effects are statistically significant for the most affected group of firms. Firms experiencing the largest shocks are more likely to increase investments, reduce their leverage, and retain larger cash holdings.

To add robustness to the main results, we also develop a synthetic differences-in-differences (SDiD) approach following the estimator for causal effects with panel data described in Arkhangelsky et al. (2021). The SDiD approach constructs a synthetic control group that best mimics the treatment group's trend in the pre-treatment period. Each treatment firm is replicated by re-weighting a sparse combination of units from the control group. For the re-weighting, more importance is given to those observations closer in time to the treatment point. This approach can be particularly advantageous when the treatment effect is heterogeneous or when the assumption of parallel trends may not hold strictly. This procedure is often applied when

there is a limited number of treated or control units, which is the case for the firms in Phase II.

Thus, in this part of the analysis, we designate the firms in Phase II as the treatment group, and the control group is the firms in Phase I. The weights are chosen to optimally match the pre-adoption outcomes of the firms in Phase II and capture any possible trends. The difference between the observed outcomes post-adoption and the predicted outcomes is the estimated treatment effects using the method in Abadie (2021). The results, as shown in Table IA.5, are similar to those in Table 5.

By confirming that the results hold under the SDiD approach, we show that our results are not driven by any particular specification of the control group or any potential violation of the parallel trends assumption. In essence, this conservative approach provides an additional robustness test of the treatment effect, and it helps underscore the robustness of our main findings: An accelerated repayment of accumulated public arrears has significant implications for firm investment, leverage, and liquidity policies.

5 The role of financing frictions

The results so far show that firms exposed to late payment delay investment opportunities and borrow to continue operations. The increased liquidity in these firms after repayment is consistent with the presence of financial frictions and with costly uncertainty about late payment. Thus, in this section, we discuss the role of financing frictions in the context of government arrears and extend the empirical analysis by conditioning on the financial constraints of firms to shed light on the heterogeneous responses caused by the accelerated repayment of arrears.

5.1 Measuring financing constraints

In a frictionless financial market, firms should be able to borrow using their government arrears as collateral and continue investing. As Figure 2 shows, factoring became less of an option during this period. In 2007, the annual factoring volume was above 30% of the Spanish GDP, but after the financial crisis burst, it dropped steadily to almost a third of its previous volume. Such a decline was much more severe than the reduction in economic activity, which can be seen in the Spanish business turnover index.

We analyze whether the effect of the repayment shock on corporate outcomes depends on how financially constrained firms are. As a measure of financing constraints, we use the firms' banking relations. Bank–firm relations are known to be quite stable (Petersen and Rajan, 1994; Santos and Winton, 2008; Darmouni, 2020). Bentolila et al. (2018) and Jimenez et al. (2014) also show that the financial crisis had a heterogeneous impact on Spanish banks, which affected firms through bank-firm linkages.

We classify firms into "top banks" if they worked with at least one top bank in 2009.[19] Bank stress test results are an indicator of a bank's vulnerability and its capacity to lend. We define top banks as those with a core equity tier 1 (CET1) capital ratio above 7.4% of risk-weighted assets, which was the average CET1 capital ratio for the overall Spanish banking sector in the adverse scenario of the stress tests run by the European Banking Authority (EBA) in 2011.[20]

Note that factoring transactions shrank sharply during this period (as shown in Figure 2), and they did so differently across banks. Figure IA.5 shows the average amount of factoring of Spanish SPP arrears by top banks vs. non-top banks. One can see that top banks were able to provide more factoring than non-top banks, particularly after the onset of the financial crisis in 2008.

We use the specification in Equation 1 and split firms into "top banks" or "excluding top banks," depending on whether, in 2009, they worked with at least one top bank.[21] We also split firms according to the size of the repayment received. We look particularly at firms that received a repayment shock below 1% of their total assets and firms that received a repayment shock above 10% of their total assets. Firms in the lower repayment group act as an additional control group for our analyses. Firms in the higher repayment group received a greater shock and are the most "treated" firms. Thus, consistent with our results in Section 4.3, they are expected to react more to the shock. The information on these two groups allows us to extract conclusions on whether the reaction of firms to late payment depends on the extent of the accumulated arrears.

5.2 Financing constraints

Panel A of Table 6 shows that only financially constrained firms (i.e., those not linked to top banks) that had accumulated substantial arrears increased their investment significantly after the 2012 repayment. This suggests that firms operating with top banks are not financially constrained and do not reduce investment despite their accumulation of arrears. In particular, firms that did not operate with a top bank and received a large repayment shock increased investment by 9%.

In Panel B of Table 6, one can see that firms with at least a top bank significantly reduce liabilities once they receive the repayment shock in 2012. This shows that firms working with top banks that receive a large repayment shock repay liabilities to reduce their leverage growth by 18.4%. Firms with no relationship with top banks devote less to reducing leverage (13%

[19] If the company does not report bank relations in 2009, we use the last available reported relationship before 2009. If the company does not report any bank information before 2010, we use 2010 information.

[20] See the following website for the 2011 EBA stress tests results for Spanish banks: https://www.bde.es/wbe/en/noticias-eventos/otros-temas-interes/pruebas-resistencia-sector-bancario-europeo/

[21] In Table IA.6, we show that Phase I and Phase II firms are very similar in 2011, regardless of whether they work with top banks or not.

reduction). This is an important result, as it highlights that firms that were less financially constrained were able to borrow more and invest more (as shown in Panel A) during the accumulation of arrears. When the arrears are paid, less constrained firms devote a larger share of their liquidity injection to reducing leverage. This is consistent with having accumulated more liabilities and with having already invested in their most profitable investment opportunities. Still, firms with no relationship with top banks significantly reduce leverage, so in the next section, we decompose leverage and show that these firms managed to borrow from suppliers, not from banks.

Panel C of Table 6 shows that both groups of firms significantly accummulate cash after receiving the repayment. Firms with top banks increase cash holdings growth by 53%, and firms without top banks increase cash holdings growth by 40%.[22] This accumulation of cash may be a buffer for future investments or some other form of precautionary saving.[23] Relatedly, our results in Panel A of Table 6 may be interpreted as a lower bound of the effect that a similar program could have in the context of expanded investment opportunities or in a context in which firms are less prone to retain cash. Firms without top banks might be willing to retain cash even if they simultaneously increase investment because greater cash balances make them safer. Harford et al. (2014) show that firms mitigate refinancing risk by increasing cash holdings and conserving cash. Our results are in line with Cunha and Pollet (2020), which show that unconstrained firms can rely more on external financing when investment opportunities arise, while financially constrained firms prefer to keep high cash levels.

5.3 Financial debt and trade credit

Next, we analyze with more detail the impact of late payment on firms' liabilities. In particular, Panel A of Table 7 shows that firms with top banks that had larger arrears significantly reduce financial debt. This confirms the interpretation of Panel B of Table 6 and suggests that less financially constrained firms were able to increase debt levels temporarily to offset the financing needs that originated from the accumulation of arrears. In column 4 of Panel A, however, we show that firms that did not use top banks do not significantly reduce financial debt after repayment, which suggests they could not increase debt levels when arrears accumulated before 2012. Instead, column 4 of Panel B shows that financially constrained firms significantly decrease their accounts payable after repayment in 2012. These results suggest that financially constrained firms had to recourse to delayed payments to suppliers before 2012 because financial

[22]Note that in 2011 firms with top banks held 4.8% of their assets in cash, while firms without top banks held 6.4%. See Table IA.6. Therefore, as the relative increase in cash is very similar across both groups, the accumulation of cash relative to assets is more intense for constrained firms.

[23]See for example Bates et al. (2009) for evidence on precautionary motives driving firms to increase their cash ratios in riskier times.

debt was unavailable to them.[24] Thus, these results provide evidence that late payment by local governments may spread through the supply chain, particularly for financially constrained firms.[25] Moreover, these findings speak to the importance of the government policy that we are analyzing, as the repayment program may impact not only firms with arrears but also connected firms.

Overall, our findings in Section 5 suggest that firms not borrowing from top banks (e.g., firms that are arguably more financially constrained) significantly increase investment and reduce their accounts payable upon repayment, implying the easing of their financial constraints. Conversely, companies that had the possibility to borrow from top banks, which are less financially constrained, do not increase investment significantly in the period after the repayment. Rather, these less financially constrained firms allocate a greater portion of the repayment to reduce their outstanding leverage and, in particular, financial debt. These results suggest that firms were able to obtain financial debt by borrowing against their accounts receivable with the local governments. Both groups of companies significantly increase their cash holdings, suggesting that, after facing an episode of delayed payments, firms decide to hold more cash to help cover future late payment and other short-term costs, even when they had the capacity to borrow against these unpaid bills.

5.4 Firm responses to late payment

In the previous section, we analyze the firm actions in response to the accelerated repayment of arrears as an indirect way to infer their policies during the build up of public arrears. In this section, as a complementary analysis, we explore some direct descriptive evidence of these same effects.

More specifically, we measure the effects on investment and financing policies during the build up of public arrears in the 2009-2011 period. To do so, we depart from our main identification strategy. In particular, we compare firms with public arrears to a re-weighted sample of nearly 90,000 Spanish firms without public arrears.[26] We use the weights to match the first and second moments of total assets and the firm's relevant outcomes in 2008 for the treatment and control group. Panel A of Table IA.7 presents summary statistics of the matched sample in 2008, showing no significant differences between the two groups.

In Panel B of Table IA.7, we show the baseline results. Each coefficient can be interpreted as the average deviation of the dependent variable between treated and control firms during

[24] See Garcia-Appendini and Montoriol-Garriga (2013) for a depiction of how financially constrained firms are supported by less constrained suppliers during the financial crisis.

[25] Alfaro et al. (2021) show that bank credit shocks can propagate downstream in the supply chain and affect suppliers in a sample of Spanish firms in a similar time period. See also Boissay and Gropp (2013) for a study of French firms that demonstrates how trade credit default shocks can propagate to downstream firms.

[26] To be more conservative, firms are categorized as having arrears if their total unpaid bills exceed 1% of their assets in 2011 and as not having arrears if their unpaid bills are below this threshold.

the 2009-2011 period. All regressions include year x region x industry fixed effects. During this period, firms exposed to arrears accumulate more liquidity and borrow more, both from banks and from their suppliers. In Panel C, we separate the results across firms that work with or without top banks. The results show that the reduction in investment is mainly driven by financially constrained firms who borrow mostly from their suppliers. On the other hand, firms with better access to finance do not reduce their investment. Instead, they borrow more from banks. Both groups of firms hoard additional liquidity. These results are consistent with those in sections 5.2 and 5.3 and show that the response of firms to late payment depends crucially on their levels of financing constraints. While firms with top banks managed to absorb the late payment shock by securing additional bank loans, financially constrained firms were unable to do so, forcing them to cut investment and extend payables to suppliers. From a policy perspective, the results highlight the significant impact of late public procurement payments, emphasizing the need to consider firms' financing constraints.

Note that the research design underlying our main results differs significantly from the design used in this section. The time periods, control groups, and the assumptions required for causal interpretation vary between the two specifications. However, the consistency of the results across both sections serves to cross-validate our findings.

6 Arrears and public procurement contracting

In this section, we study how delayed payments from public administrations influence procurement contracting within a firm-customer relationship. In principle, several effects could be at play. Firms with existing arrears may want to contract with the same public administrations more often as a way to enforce the repayment of arrears by keeping the commercial relationship open. Conversely, firms may want to cut their commercial relationship with the public administrations if the existing arrears signal further late repayments that they cannot face.[27]

In this section, we focus on firms that have contracts with local administrations (municipalities or municipal councils) and study whether there is a distinct behavior in public contracting between firms with unpaid public arrears and firms that are paid in a timely manner.

To examine the effects of delayed payments on public procurement contracting, we employ a new specification in which each observation measures new procurement contracts at the firm-customer-year level. The research design consists of examining the procurement contracting of a firm with a municipality with whom it holds arrears and the contracting of the same firm with another municipality with whom it does not hold arrears while controlling for demand effects at the local level and supply shocks at the firm level.

[27]Relatedly, Breza and Liberman (2017) show that imposing legal limits on the maturity of trade credit contracts affects customer-supplier relationships.

To do so, the ICO database is merged with the Opentender database. Opentender is a comprehensive European-level public online database that compiles extensive information on government procurement activities.[28] We aggregate the contract-level data in Opentender to a firm-customer-year level, where "customer" refers to a local government of a municipality and "firm" to a supplier listed in Opentender. We aim to analyze the decision-making process behind potential contracts between firms and municipalities. To do this, we construct a panel dataset using the following method: For each municipality-firm pair, if there is any new contract in the Opentender database during our sample period (2009–2012), we record that contract in the data. Then, we fill with zeros all the other years for that firm-municipality pair for which there is no contracting. Thus, in our dataset, we are assuming that each firm-municipality pair listed in Opentender holds the potential to engage in procurement contracting in any of the years in our sample. Additionally, drawing on the data from the ICO database, we augment this dataset with information on public arrears for each municipality-firm pair already in our dataset.[29] In the merged dataset, each observation provides information on the size of the contract, along with the accumulated arrears for every municipality–firm-year combination. This dataset allows us to study the decisions of firms to engage in new business relationships with public entities, particularly in the context of payment delays.

We hypothesize that a firm's level of unpaid bills, or "arrears", with a specific customer may affect its procurement decisions with that same customer. Specifically, we aim to study whether contracting with public governments changes if firms have arrears. To test this, we compare firm-customer pairs with different levels of arrears while controlling for aggregate demand changes at the local level and aggregate supply shocks at the firm level. Thus, we include firm $\times$ year fixed effects to isolate firm-specific shocks and implicitly compare the contracting of a firm with a municipality that is not paying on time with the contracting of that same firm with a different municipality that is paying on time. In addition, we also include municipality $\times$ year fixed effects to compare firms that have similar exposures to economic conditions and local demand at the municipality level.[30]

We estimate the following specification:

$$Contract_{jit} = \beta_t(Arrears_{ji} \times Year_t) + \lambda_{jt} + \delta_{it} + \varepsilon_{jit} \tag{2}$$

[28] For procurement contracts to appear in Opentender, there is a threshold on size that is sector-specific and depends on the type of government and type of contract. The median contract size in Opentender is €350,000, which implies that contracts are much larger than those in ICO.

[29] Since we study how the 2012 repayment of accumulated arrears affects firms' public procurement decisions, we focus on Phase I firms only.

[30] Accounting for aggregate demand in procurement is important. For example, Garcıa-Santana and Santamarıa (2023) show a significant level of home bias and local concentration in procurement. In addition, several factors can affect the likelihood of a procurement contract and the existence of arrears; for example, Ricca et al. (2020) show that the speed of payment in procurement contracts is affected by a firm's political connections. Ferraz et al. (2015) shows that firms awarded procurement contracts have a higher likelihood of winning more public auctions in the future. This shows that trade relations have a bilateral component.

where $Contract_{jit}$ is either an indicator variable to denote whether firm j enters a new public procurement contract with municipality i in year t, or the actual size of those contracts. $Arrears_{j,i}$ is a dummy variable taking a value of one if firm j has accumulated arrears with municipality i at the end of 2011, and taking a value of zero otherwise.[31] $Year_t$ are dummy variables for years 2009, 2010, 2011, and 2012, respectively. Firm-time (λ_{jt}) and buyer municipality-time (δ_{it}) fixed effects absorb any firm- and municipality-specific time-varying shocks, respectively. The coefficients of interest are β_{2011} and β_{2012}, which reflect the effect on procurement contracting of having public contracts that are paid late relative to having public contracts that are paid on time for the year in which arrears accumulated the most (2011) and the year when they were eventually repaid (2012). The coefficients β_{2009} and β_{2010} are expected to exhibit a lower effect than the coefficient β_{2011}, since most of the accumulated arrears at the end of 2011 are from 2011. Standard errors are clustered at the firm and municipality level.

The results are shown in Table 8. In Column 1, the dependent variable is one if there is a new contract between a firm and a local government and zero otherwise. Column 2 adopts a more continuous specification where the dependent variable takes the value zero if there is no contract and equals the natural logarithm of one plus the value of all awarded contracts between the firm and local government in a given year. We find that firms with accumulated arrears with a certain municipality are less likely to contract with that same municipality in the year before the repayment shock (2011). In particular, we find that firms with unpaid bills are about 22% less likely to start a new contract. When zooming into the actual amount of procurement contracts, we find that having accumulated arrears leads to a decrease of about 3% of the size of contracts.

While we show that arrears negatively affected procurement contracting in 2011, we also find that the effect is not significant after the repayment shock in 2012. Given the long-term nature of some of these contracts, this suggests that the accelerated repayment of arrears did not induce the recovery of commercial relations since we do not see a positive coefficient in 2012 that offsets the negative effect in 2011. This implies that relationships that break in 2011 do not recover, suggesting a certain degree of hysteresis in procurement contracts, nor do new relationships appear in 2012 to compensate for them. This has important policy implications, as it shows that while unconventional fiscal policies that accelerate the repayment of arrears can quickly stop the deterioration of contracting between firms and their public customers, the commercial relationships broken due to late payment are never restored.

These findings shed light on the relationship dynamics between firms and public procurement, particularly regarding the impact of late payment on business ties between customers and suppliers. Our results indicate that if public administrations delay their payments, relations deteriorate, and customers might hesitate to pursue further public procurement contracts with

[31] In this Section, we drop firms with arrears under 0.006% of their assets (bottom 5%) to assure that the treated group has an economically meaningful level of arrears.

them. Once the creditworthiness of customers is restored, the deterioration of the commercial relationships stops; however the firm–municipality links previously lost due to late payment are never recovered.

7 Conclusion

We study the effect of late payment of procurement contracts on firms' policies. We use a large, accelerated repayment by the government in Spain in 2012 as a natural experiment. Using a unique dataset and a clean causal identification strategy, we find that firms' corporate policies are significantly affected by the unexpected government repayment program.

The impact of the policy varies across firms with different financing constraints. Financially unconstrained firms use the liquidity received to repay financial debt and accumulate cash but do not increase investment. In contrast, financially constrained firms significantly increase investment after repayment. They also repay suppliers, providing evidence that this policy had spillover effects in the supply chain through trade credit. These results shed light on how firms manage late payments. Less financially constrained firms rely on external borrowing to mitigate the effects of arrears, whereas financially constrained firms are forced to forgo investment opportunities and delay payments to suppliers.

Firms also adjust their commercial relationships with the public sector in response to late payment. We show that, in general, firms affected by government arrears tend to reduce their contracting with the public sector. This deterioration of commercial ties between firms and public administrations is permanent, as these ties are not restored after repayment.

Our findings show that government arrears affect firms' policies, contributing to the literature on the financial aspects of public procurement. While government procurement can offer more stable demand, late payment can negatively affect financially constrained firms. Our results also connect more broadly to the trade credit literature by illustrating how firms manage late payments, particularly through adjustments in borrowing, investment, and supplier repayments. Furthermore, the results contribute to the scarce literature on financial factoring by revealing firms' inability to fully collateralize public arrears.

From a policy perspective, our paper highlights the importance of payment terms and late payments in procurement contracting. It also shows that financing constraints and liquidity access through factoring matter when assessing the impact of late payments. Thus, payment terms and financial market conditions should be considered when evaluating the effects of fiscal policy (e.g., a fiscal stimulus). Moreover, we provide insight into an unorthodox fiscal policy that leaves public liabilities unchanged but has real effects. Early repayment of arrears affects corporate investment and economic growth, with heterogeneous effects across firms.

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Table 1: Summary Statistics

This table reports average firm characteristics for firms in Phase I and Phase II, the differences between the two groups of firms, and the p-values associated with those differences. Phase I includes the sample of firms that worked for local government entities that received the liquidity shock in year 2012, while Phase II includes firms that received the liquidity shock in 2013. Firm characteristics are all measured in year 2011.

	(1) Phase I	(2) Phase II	(3) Difference	(4) P-value
Repayment shock	142.360	102.105	-40.255	(0.460)
Investment	0.009	0.056	0.047	(0.136)
Leverage growth	-0.017	0.003	0.020	(0.408)
Liquidity growth	-0.151	-0.102	0.049	(0.364)
Total assets	5,139.655	6,743.966	1,604.311	(0.161)
Total liabilities	3,244.934	4,549.020	1,304.086	(0.123)
Cash	280.514	269.317	-11.197	(0.806)
Leverage ratio	0.373	0.396	0.022	(0.197)
Total debt	1,554.632	2,323.752	769.120	(0.127)
Long-term debt	814.032	1,168.053	354.021	(0.178)
Short-term debt	578.430	792.305	213.875	(0.195)

Table 2: Effects on Corporate Policies

This table presents estimates from panel regressions explaining corporate policies for the period 2009 to 2012. The dependent variable in Columns 1 and 2 is the first difference in the logarithm of fixed assets (Investment), the first difference in the logarithm of total liabilities in Columns 3 and 4 (Leverage growth), and the first difference in the logarithm of cash in Columns 5 and 6 (Liquidity growth). *Treated* is an indicator variable that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. *Year 2012* is an indicator variable for year 2012. Columns 1, 3, and 5 include year, region, and industry fixed effects. Columns 2, 4, and 6 include the interaction of *year* × *region* × *industry* fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

	Investment		Leverage Growth		Liquidity Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.014	-0.014	-0.012	-0.010	-0.014	-0.014
	(-0.96)	(-0.94)	(-0.80)	(-0.71)	(-0.61)	(-0.60)
Treated × Year 2012	0.052**	0.056**	-0.002	-0.010	0.126**	0.130**
	(2.08)	(2.17)	(-0.06)	(-0.35)	(2.23)	(2.28)
Year FE	Yes	No	Yes	No	Yes	No
Region FE	Yes	No	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No	Yes	No
Year x Region x Industry FE	No	Yes	No	Yes	No	Yes
Observations	119838	119821	121125	121108	109238	109220
Adjusted R^2	0.003	0.002	0.009	0.011	0.007	0.010

Table 3: Dynamic Effects on Corporate Policies

This table presents estimates from panel regressions explaining corporate policies for the period 2009 to 2012. The dependent variable in Columns 1 and 2 is the first difference in the logarithm of fixed assets (Investment), the first difference in the logarithm of total liabilities in Columns 3 and 4 (Leverage growth), and the first difference in the logarithm of cash in Columns 5 and 6 (Liquidity growth). *Treated* is an indicator variable that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. *Year 2009*, *Year 2010*, and *Year 2012* are indicator variables for years 2009, 2010, and 2012, respectively. The omitted year (baseline) is 2011. Columns 1, 3, and 5 include year, region, and industry fixed effects. Columns 2, 4, and 6 include the interaction of *year* × *region* × *industry* fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

	Investment		Leverage Growth		Liquidity Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.046	-0.047	-0.016	-0.009	-0.062	-0.064
	(-1.47)	(-1.46)	(-0.66)	(-0.36)	(-1.15)	(-1.18)
Treated × Year 2009	0.052	0.055	0.014	0.006	0.112	0.131
	(1.42)	(1.47)	(0.41)	(0.16)	(1.42)	(1.63)
Treated × Year 2010	0.045	0.044	-0.001	-0.010	0.036	0.025
	(1.16)	(1.12)	(-0.02)	(-0.27)	(0.45)	(0.30)
Treated × Year 2012	0.084**	0.088**	0.003	-0.011	0.174**	0.180**
	(2.28)	(2.35)	(0.07)	(-0.31)	(2.13)	(2.20)
Year FE	Yes	No	Yes	No	Yes	No
Region FE	Yes	No	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No	Yes	No
Year x Region x Industry FE	No	Yes	No	Yes	No	Yes
Observations	119838	119821	121125	121108	109238	109220
Adjusted R^2	0.003	0.002	0.009	0.011	0.007	0.010

Table 4: Effects on Corporate Policies: Intensity of Repayment

This table analyzes corporate policies for the period 2009 to 2012. The dependent variables are the first difference in the logarithm of fixed assets (Panel A: Investment), liabilities (Panel B: Leverage growth), and cash (Panel C: Liquidity growth). *Treated* is a dummy that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. Firms from Phase I and Phase II are matched based on total assets and the size of the repayment shock. *Year 2012* is an indicator variable for year 2012. We sort our sample into firms that received a repayment shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include the interaction of *year* × *region* × *industry* fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated	-0.014	-0.017	-0.015	-0.028
	(-0.95)	(-1.11)	(-0.87)	(-1.61)
Treated × Year 2012	0.047*	0.062**	0.077**	0.114***
	(1.69)	(2.15)	(2.56)	(3.65)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Observations	79540	41667	15164	18659
Adjusted R^2	0.045	0.037	0.024	0.037

Panel B: Leverage growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated	-0.015	-0.021	-0.012	0.003
	(-0.92)	(-1.27)	(-0.65)	(0.16)
Treated × Year 2012	0.026	0.030	0.012	-0.128***
	(0.82)	(0.90)	(0.35)	(-3.60)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Observations	80002	42068	15330	19045
Adjusted R^2	0.084	0.073	0.070	0.091

Panel C: Liquidity growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated	0.006	-0.000	-0.018	-0.011
	(0.25)	(-0.00)	(-0.68)	(-0.41)
Treated × Year 2012	-0.019	0.035	0.152**	0.402***
	(-0.33)	(0.61)	(2.44)	(6.52)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Observations	72602	38058	13933	17253
Adjusted R^2	0.061	0.059	0.046	0.082

Table 5: Effects on Corporate Policies: Firm FE

This table analyzes corporate policies for the period 2009 to 2012. The dependent variables are the first difference in the logarithm of fixed assets (Panel A: Investment), liabilities (Panel B: Leverage growth), and cash (Panel C: Liquidity growth). *Treated* is a dummy that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. Firms from Phase I and Phase II are matched based on total assets and repayment shock. *Year 2012* is an indicator variable for year 2012. We sort our sample into firms that received a repayment shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include the interaction of *year* × *region* × *industry* fixed effects and firm fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, **, or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.037	0.046*	0.061**	0.082***
	(1.38)	(1.72)	(2.12)	(2.68)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	78121	40607	14694	17918
Adjusted R^2	0.119	0.105	0.068	0.089

Panel B: Leverage growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.031	0.029	0.004	-0.147***
	(0.97)	(0.90)	(0.12)	(-4.13)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	78610	41025	14867	18289
Adjusted R^2	0.120	0.104	0.075	0.109

Panel C: Liquidity growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.010	0.054	0.158**	0.421***
	(0.18)	(0.93)	(2.43)	(6.54)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	70630	36757	13365	16376
Adjusted R^2	-0.091	-0.098	-0.141	-0.095

Table 6: Effects on Corporate Policies: Bank Heterogeneity

This table analyzes corporate policies for the period 2009 to 2012 across bank types. Firms from Phase I and Phase II are matched based on bank type, total assets, and the repayment shock. *Treated* is a dummy that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. *Year 2012* is an indicator variable for year 2012. We sort our sample into firms that received a repayment shock below 1% and above 10% of their total assets. The sample "top banks" includes all firms that in 2009 worked with at least one bank with a core equity tier 1 (CET 1) capital ratio above 7.4. The sample "excluding top banks" includes all other firms. In Panel A, the dependent variable is the first difference in the logarithm of fixed assets. In Panel B, the dependent variable is the first difference in the logarithm of total liabilities. In Panel C, the dependent variable is the first difference in the logarithm of cash. All regressions include the interaction of *year* × *region* × *industry* fixed effects and firm fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

	Top Banks		Excluding Top Banks	
	$< 1\%$	$> 10\%$	$< 1\%$	$> 10\%$
Treated × Year 2012	0.006	0.036	0.043	0.088**
	(0.18)	(0.73)	(1.25)	(2.39)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	28498	4143	49581	13625
Adjusted R^2	0.133	0.086	0.140	0.105

Panel B: Leverage growth

	Top Banks		Excluding Top Banks	
	$< 1\%$	$> 10\%$	$< 1\%$	$> 10\%$
Treated × Year 2012	0.008	-0.184***	0.040	-0.130***
	(0.20)	(-3.91)	(0.95)	(-2.90)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	28566	4168	50002	13972
Adjusted R^2	0.162	0.040	0.141	0.122

Panel C: Liquidity growth

	Top Banks		Excluding Top Banks	
	$< 1\%$	$> 10\%$	$< 1\%$	$> 10\%$
Treated × Year 2012	0.038	0.532***	0.012	0.397***
	(0.35)	(3.93)	(0.19)	(5.44)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	26404	3864	44172	12359
Adjusted R^2	0.022	-0.099	-0.086	-0.083

Table 7: Financial Debt and Accounts Payable

This table explores leverage for the period 2009 to 2012. The dependent variables are the first difference in the logarithm of financial debt (Panel A) and accounts payable (Panel B). *Treated* is a dummy that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. Phase I firms are matched to firms in Phase II. *Year 2012* is an indicator variable for year 2012. We sort our sample into firms that received a repayment shock below 1% and above 10% of their total assets. The sample "top banks" includes all firms that in 2009 worked with at least one bank with a core equity tier 1 (CET 1) capital ratio above 7.4. The sample "excluding top banks" includes all other firms. All regressions include the interaction of *year* × *region* × *industry* fixed effects and firm fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, **, or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Financial debt growth

	Top Banks		Excluding Top Banks	
	$< 1\%$	$> 10\%$	$< 1\%$	$> 10\%$
Treated × Year 2012	-0.086*	-0.379***	0.095	-0.123
	(-1.75)	(-3.82)	(1.10)	(-1.49)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	12213	1204	15253	2735
Adjusted R^2	0.274	0.166	0.143	0.138

Panel B: Accounts payable growth

	Top Banks		Excluding Top Banks	
	$< 1\%$	$> 10\%$	$< 1\%$	$> 10\%$
Treated × Year 2012	0.016	-0.081	0.054	-0.159***
	(0.28)	(-1.01)	(1.01)	(-2.58)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	28205	4062	48032	12813
Adjusted R^2	0.053	-0.034	0.007	-0.038

Table 8: Effects on Public Procurement

This table presents estimates from panel regressions explaining firms' public procurement decisions for the period 2009 to 2012. In this analysis, the unit of observation is at the firm-municipality-year level. In column 1, the dependent variable is a dummy taking value 1 if there is a new contract between a firm and a municipality and taking value zero otherwise. In column 2, the dependent variable is the natural logarithm of one plus the size of all the awarded contracts between the firm and the municipality in that year. *Arrears* is a dummy taking value 1 if the firm has accumulated arrears at the end of 2011 with a municipality, and taking value zero otherwise. *Year 2009*, *Year 2010*, *Year 2011* and *Year 2012* are indicator variables for years 2009, 2010, 2011 and 2012, respectively. All regressions include *year* × *firm* and *year* × *buyer municipality* fixed effects. Robust T-statistics are clustered at the firm and municipality level and shown in parentheses. ***, **, or * indicates that the coefficient is significant at the 1%, 5% or 10% level, respectively.

	New Contract (1)	New Contract Size (2)
Arrears × Year 2009	0.183	2.810
	(1.26)	(1.44)
Arrears × Year 2010	0.161	2.159
	(1.56)	(1.57)
Arrears × Year 2011	-0.217**	-3.001**
	(-2.24)	(-2.25)
Arrears × Year 2012	-0.100	-1.006
	(-0.65)	(-0.51)
Year x Firm FE	Yes	Yes
Year x Buyer FE	Yes	Yes
Observations	3976	3976
Adjusted R^2	0.189	0.174

Figure 1: Analytical Framework

The figure represents the financial interrelations between the central government, local and regional governments, firms, and banks.

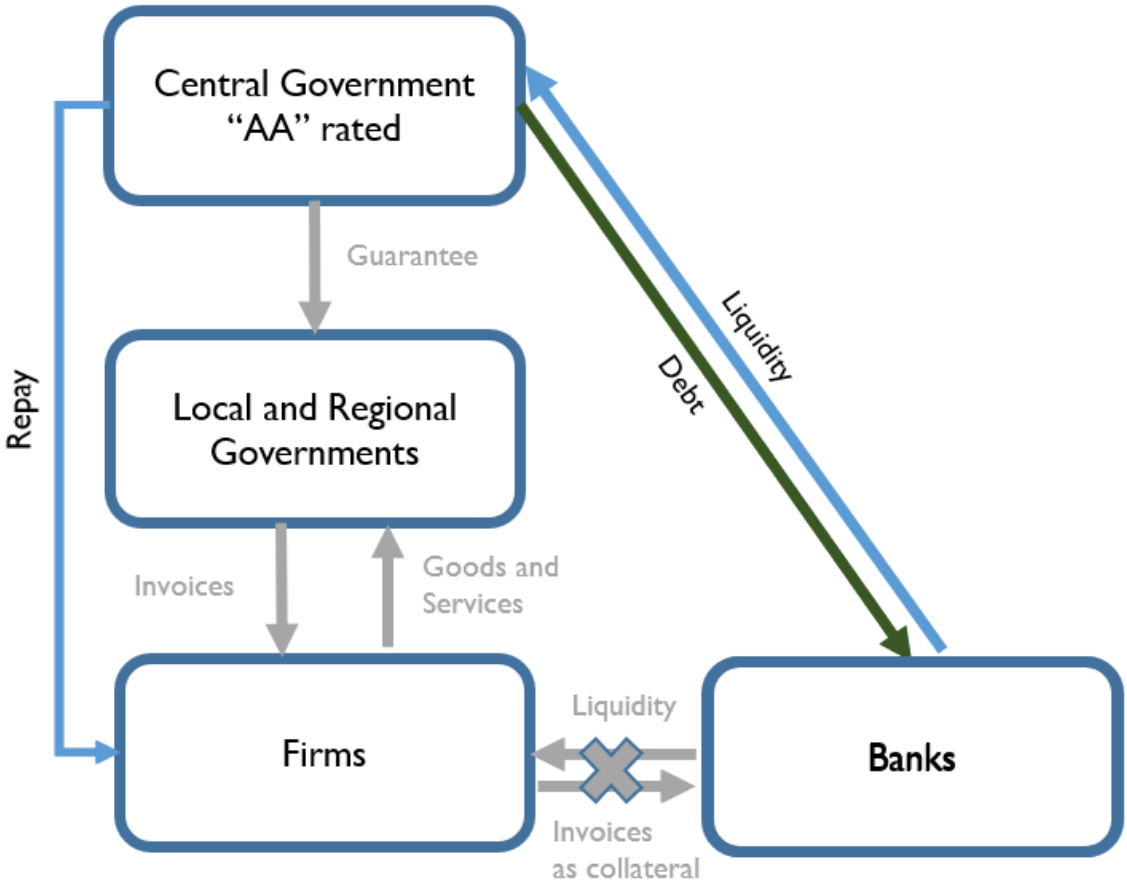
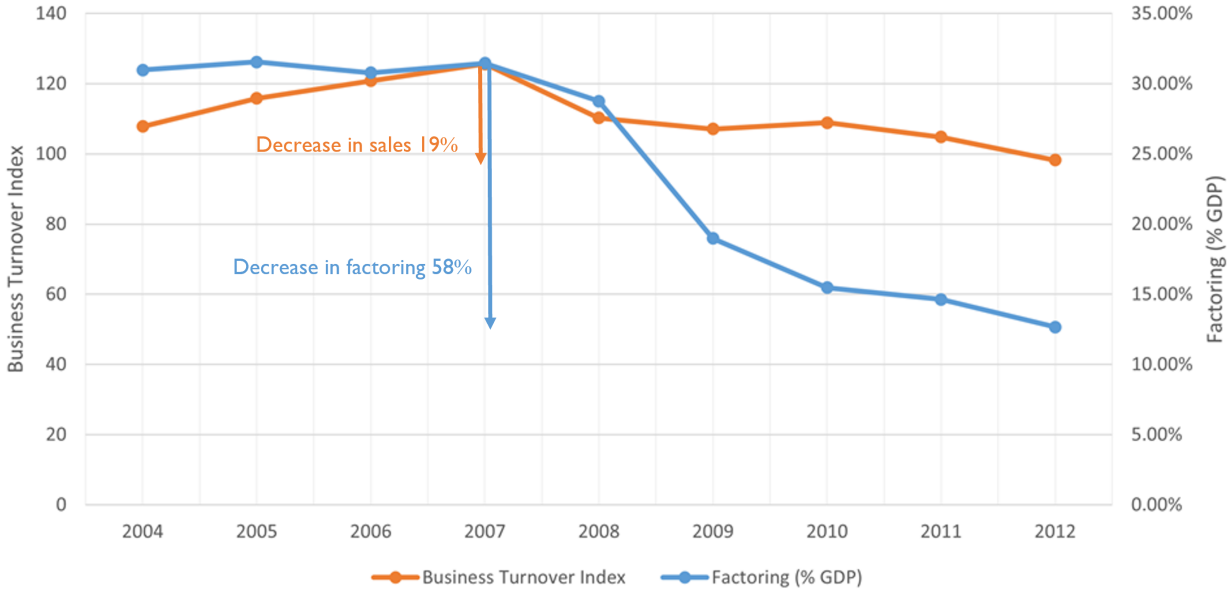


Figure 2: Factoring and Business Turnover Index

This graph shows the evolution of factoring of Spanish firms as a percentage of GDP and the Business Turnover Index for Spanish firms. This information is obtained from the Spanish Statistical Office. The period covered is 2004–2012.



Appendix for Online Publication: "Government Arrears and Corporate Policies: Lessons from a Natural Experiment"

Jose M. Abad, Vicente J. Bermejo, Vicente Cuñat and Rafael Zambrana

In this Appendix, we provide additional statistics and robustness tests for the analyses in the paper. Specifically:

- Figure IA.1: Appearance of SPP news in Spanish Newspapers
- Figure IA.2: Average Payment Delay (Days) per Sector, 2005–11
- Figure IA.3: Spanish Municipalities
- Figure IA.4: Mancomunidades and Municipalities
- Figure IA.5: Factoring of Arrears by Bank Type
- Table IA.1: Descriptive Statistics
- Table IA.2: Summary Statistics: Matched Sample
- Table IA.3: Effects on Corporate Policies: Matched Sample
- Table IA.4: Dynamic Effects on Corporate Policies: Matched Sample
- Table IA.5: Effects on Corporate Decisions: SDiD
- Table IA.6: Summary Statistics: Bank Heterogeneity
- Table IA.7: Effects on Corporate Policies: Late Payment

Figure IA.1: Appearance of SPP news in Spanish Newspapers

The figure represents the total number of times that "Plan de Pago a Proveedores" (Supplier Payment Program) and "Plan de Pago a Proveedores" and the word "Mancomunidad" appear in the Spanish news every month from January 2011 to December 2013. Source: Factiva.

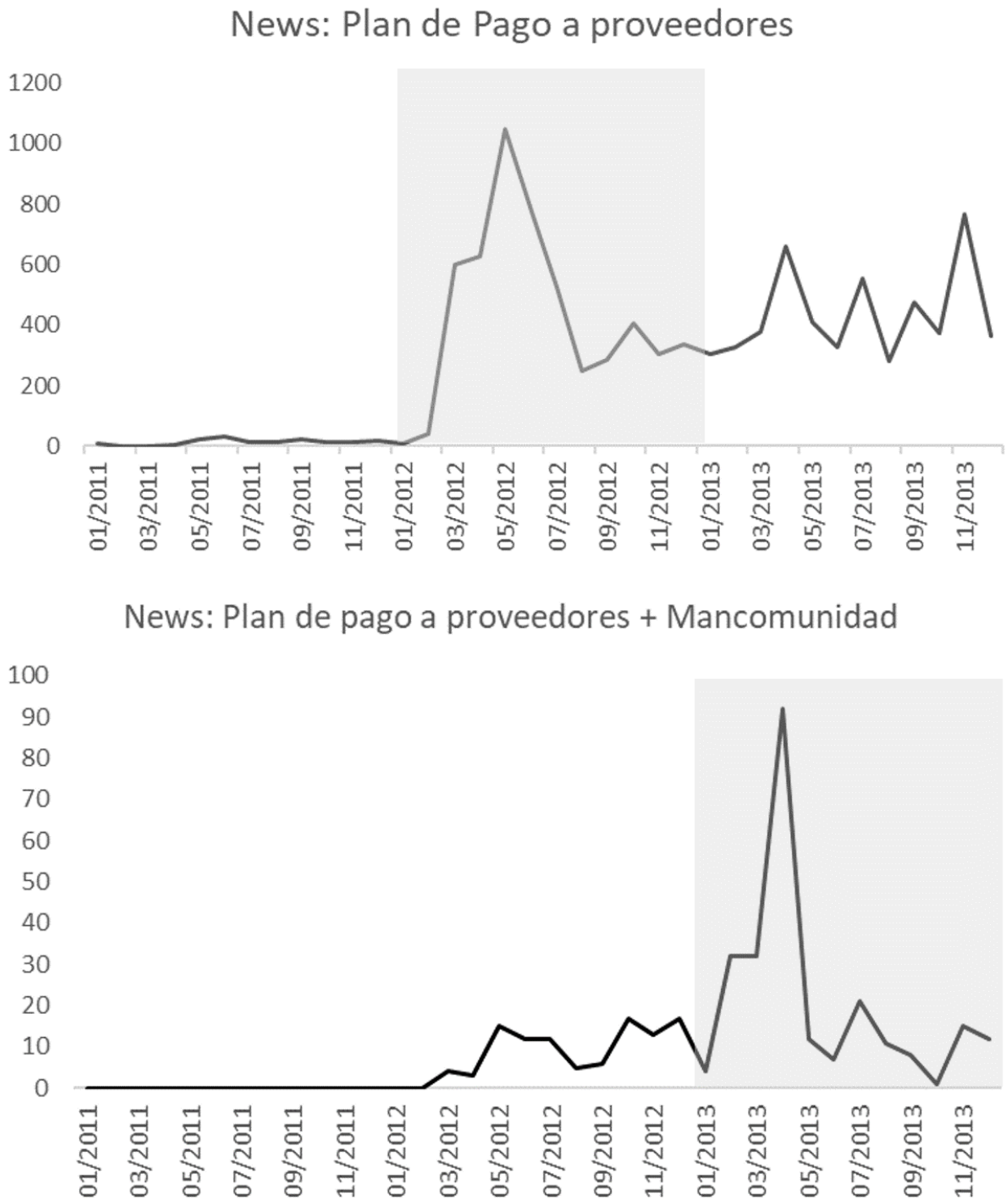


Figure IA.2: Average Payment Delay (days) Per Sector, 2005–11

The figure represents the average payment delay in days for private sector companies (orange) and for the public sector (gray) for the years 2005, 2008, 2009, 2010, and 2011.

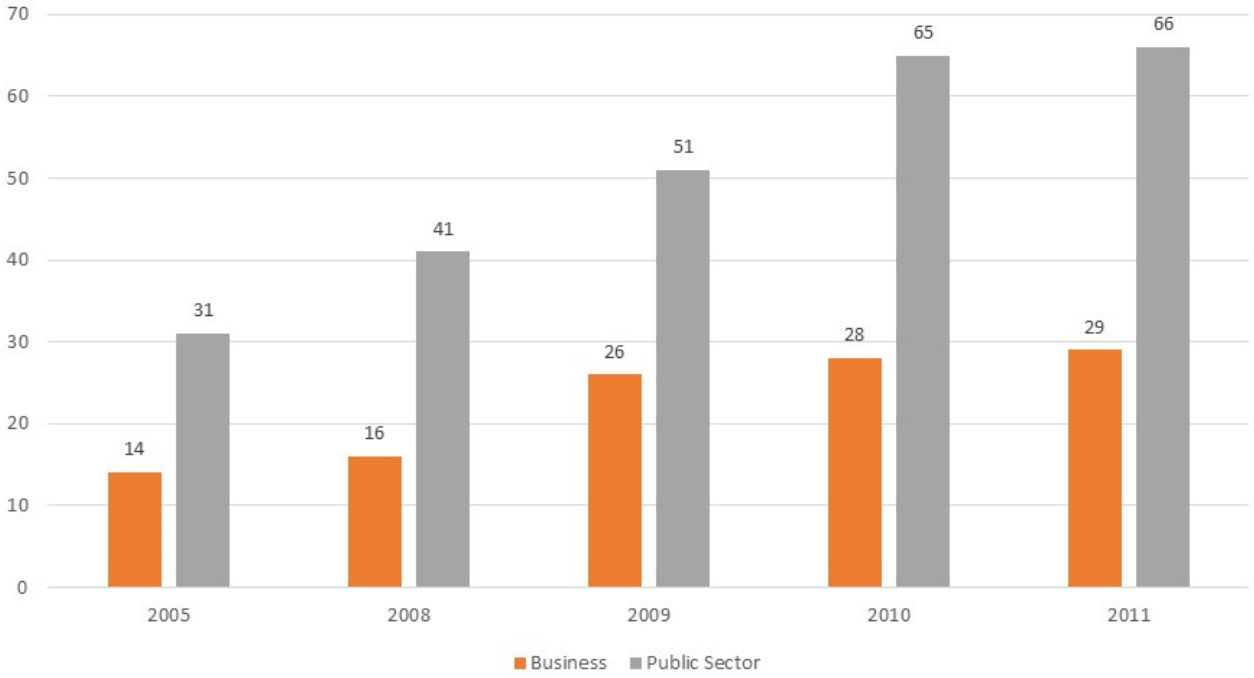
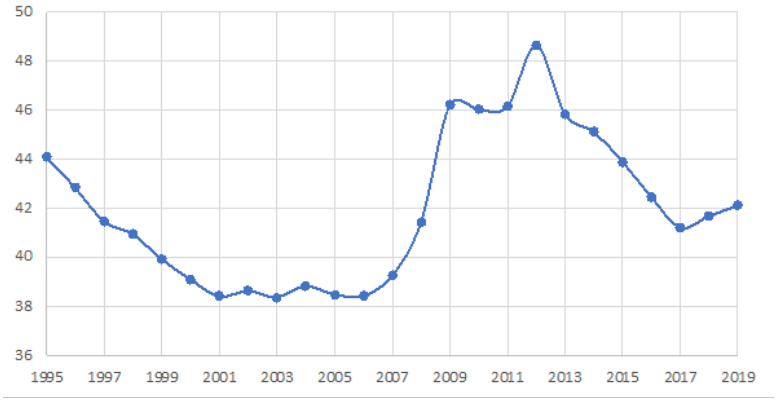


Figure IA.3: Spanish Municipalities

Panel A shows the total expenditure as a percentage of GDP for Spanish municipalities. Panel B shows the budget deficit as a percentage of GDP for Spanish municipalities. This information is obtained from the Bank of Spain. The sample covers the period 1995-2019.

Panel A: Total Expenditure (% GDP)



Panel B: Budget Deficit (% GDP)

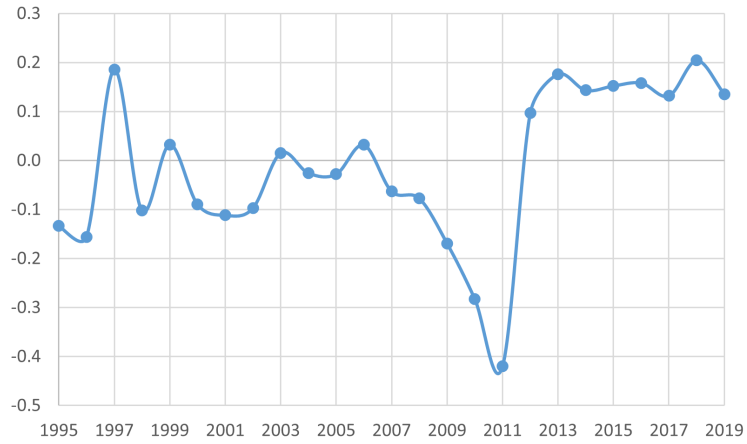


Figure IA.4: Mancomunidades and Municipalities

The figure shows the region of Andalucía in Spain and shows how municipalities in Spain can interact with suppliers as "Municipalities" that deal directly with suppliers or as "Mancomunidades" that involve several municipalities joining together to improve bargaining power. Source: Centro de Estudios Andaluces. Junta de Andalucia.

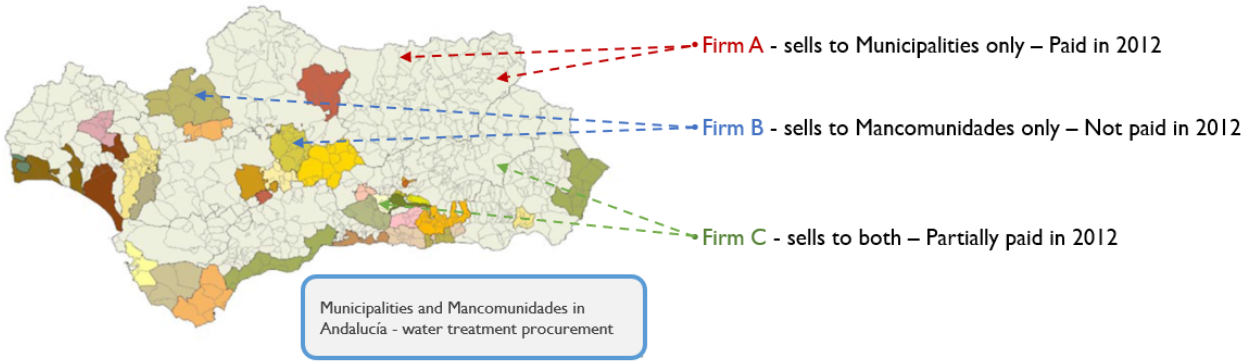


Figure IA.5: Factoring of Arrears by Bank Type

This graph shows the evolution of the factoring of arrears from the Spanish SPP by top banks and non-top banks. Top banks include banks with a core equity tier 1 (CET 1) capital ratio above 8 in the EBA stress tests developed in 2011. Non-top banks include banks with a core equity tier 1 (CET 1) capital ratio below 7.4 in the EBA stress tests developed in 2011. We sum the amount of arrears that have been factored per year and bank and calculate a weighted average for top banks vs. non-top banks. We weigh each bank by its market share in 2011. We normalize the amounts in 2008. The period covered is 2003–2011.

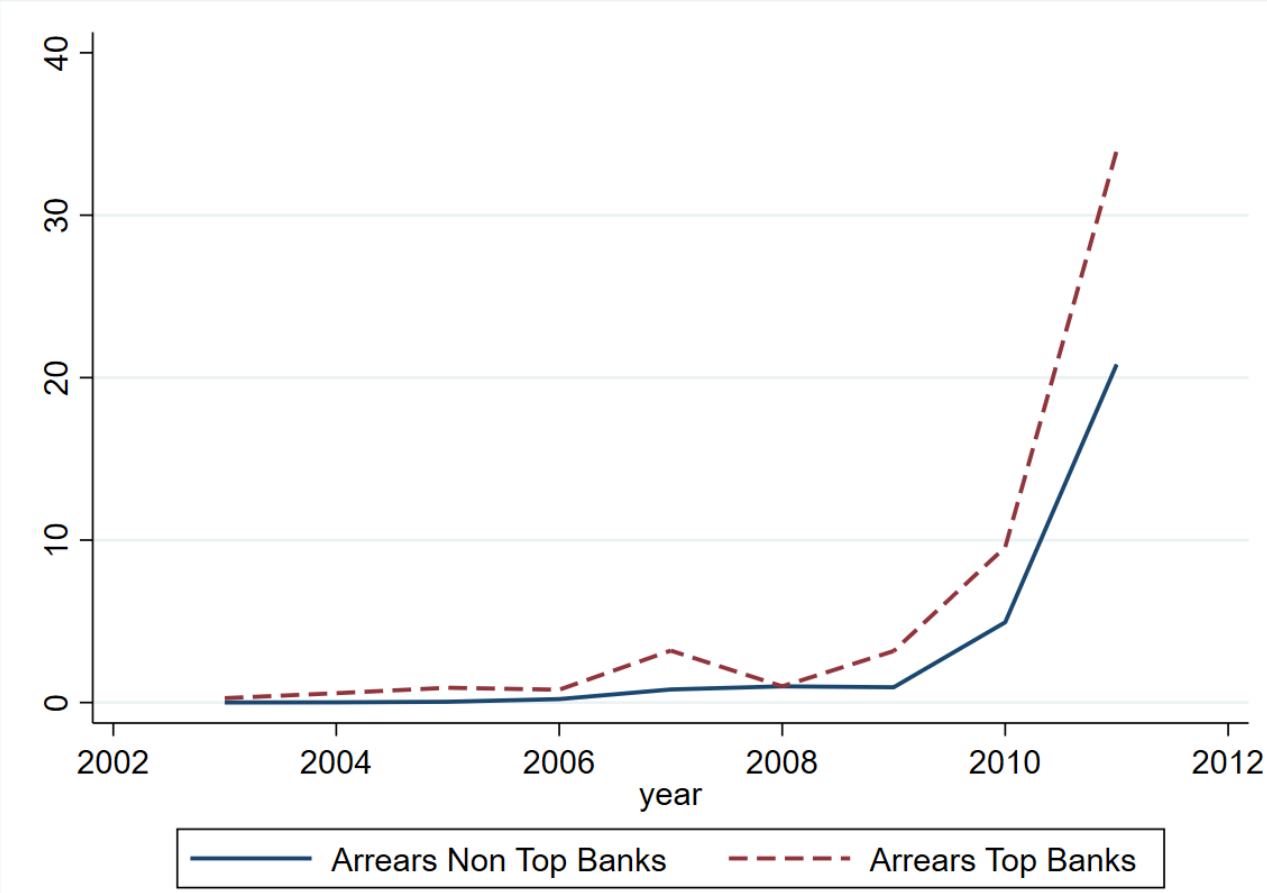


Table IA.1: Descriptive Statistics

This table reports mean, standard deviation, 25th-percentile, median, 75th-percentile, and number of observations for several variables. The sample covers the period 2009–2012.

	Mean	Std. deviation	Perc.25	Median	Perc.75	Observations
Repayment shock	125.25	1232.91	1.69	7.30	32.48	203795
Investment	0.02	0.47	-0.12	-0.03	0.06	155881
Leverage growth	-0.02	0.44	-0.18	-0.02	0.13	157309
Liquidity growth	-0.05	1.08	-0.60	-0.04	0.47	142338
Total assets	5146.40	19227.50	383.33	890.00	2448.00	166244
Total liabilities	3255.29	13179.71	220.00	515.00	1392.00	166243
Cash	294.62	1000.47	14.78	53.00	179.00	155219
Leverage ratio	0.37	0.27	0.17	0.33	0.52	107068
Total debt	1528.13	4960.33	127.00	325.00	887.00	107068
Long-term debt	804.44	3082.30	41.00	148.00	438.00	123263
Short-term debt	564.50	2041.63	26.26	93.38	298.00	134762

Table IA.2: Summary Statistics: Matched Sample

This table reports average firm characteristics for firms in Phase I and Phase II, the differences between the two groups of firms, and the p-values associated with those differences. Phase I includes the sample of firms that worked for local government entities that received the liquidity shock in year 2012, while Phase II includes firms that received the liquidity shock in 2013. Firms from Phase I and Phase II are matched based on total assets and the size of the repayment shock. Firm characteristics are all measured in year 2011.

	(1) Phase I	(2) Phase II	(3) Difference	(4) P-value
Repayment shock	142.360	142.389	0.028	(1.000)
Investment	0.009	0.057	0.048	(0.131)
Leverage growth	-0.017	0.004	0.021	(0.387)
Liquidity growth	-0.151	-0.115	0.036	(0.507)
Total assets	5,139.655	5,143.305	3.650	(0.996)
Total liabilities	3,244.934	3,394.125	149.191	(0.795)
Cash	280.514	225.966	-54.549	(0.089)*
Leverage ratio	0.373	0.399	0.025	(0.147)
Total debt	1,554.632	1,805.768	251.136	(0.504)
Long-term debt	814.032	929.024	114.992	(0.562)
Short-term debt	578.430	609.799	31.368	(0.796)

Table IA.3: Effects on Corporate Policies - Matched Sample

This table presents estimates from panel regressions explaining corporate policies for the period 2009 to 2012. The dependent variable in Columns 1 and 2 is the first difference in the logarithm of fixed assets (Investment), the first difference in the logarithm of total liabilities in Columns 3 and 4 (Leverage growth), and the first difference in the logarithm of cash in Columns 5 and 6 (Liquidity growth). *Treated* is an indicator variable that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. *Year 2012* is an indicator variable for year 2012. Columns 1, 3, and 5 include year, region, and industry fixed effects. Columns 2, 4, and 6 include the interaction of *year* × *region* × *industry* fixed effects. Firms from Phase I and Phase II are matched based on total assets and the size of the repayment shock. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

	Investment		Leverage Growth		Liquidity Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.020	-0.020	-0.017	-0.015	-0.019	-0.004
	(-1.34)	(-1.35)	(-1.09)	(-0.95)	(-0.76)	(-0.19)
Treated × Year 2012	0.056**	0.070**	0.002	0.006	0.128**	0.096*
	(2.18)	(2.51)	(0.07)	(0.17)	(2.30)	(1.76)
Year FE	Yes	No	Yes	No	Yes	No
Region FE	Yes	No	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No	Yes	No
Year x Region x Industry FE	No	Yes	No	Yes	No	Yes
Observations	114277	114260	115469	115452	104386	104368
Adjusted R^2	0.005	0.044	0.013	0.083	0.010	0.065

Table IA.4: Dynamic Effects on Corporate Policies - Matched Sample

This table presents estimates from panel regressions explaining corporate policies for the period 2009 to 2012. The dependent variable in Columns 1 and 2 is the first difference in the logarithm of fixed assets (Investment), the first difference in the logarithm of total liabilities in Columns 3 and 4 (Leverage growth), and the first difference in the logarithm of cash in Columns 5 and 6 (Liquidity growth). *Treated* is an indicator variable that takes a value of 1 for firms that received repayment in Phase I (2012) and zero for firms that received repayment a year later in Phase II. *Year 2009*, *Year 2010*, and *Year 2012* are indicator variables for years 2009, 2010, and 2012, respectively. The omitted year (baseline) is 2011. Columns 1, 3, and 5 include year, region, and industry fixed effects. Columns 2, 4, and 6 include the interaction of *year* × *region* × *industry* fixed effects. Firms from Phase I and Phase II are matched based on total assets and the size of the repayment shock. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

	Investment		Leverage Growth		Liquidity Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.052	-0.047	-0.023	-0.017	-0.043	-0.048
	(-1.62)	(-1.41)	(-0.86)	(-0.60)	(-0.75)	(-0.91)
Treated × Year 2009	0.058	0.046	0.030	0.013	0.069	0.126
	(1.51)	(1.18)	(0.74)	(0.31)	(0.78)	(1.63)
Treated × Year 2010	0.039	0.036	-0.011	-0.005	0.009	0.015
	(0.98)	(0.90)	(-0.30)	(-0.14)	(0.10)	(0.19)
Treated × Year 2012	0.087**	0.096**	0.007	0.008	0.153*	0.140*
	(2.32)	(2.38)	(0.20)	(0.18)	(1.86)	(1.78)
Year FE	Yes	No	Yes	No	Yes	No
Region FE	Yes	No	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No	Yes	No
Year x Region x Industry FE	No	Yes	No	Yes	No	Yes
Observations	114277	114260	115469	115452	104386	104368
Adjusted R^2	0.005	0.045	0.013	0.083	0.010	0.066

Table IA.5: Effects on Corporate Policies: SDiD

This table presents estimates from SDiD (Arkhangelsky et al., 2021) regressions explaining corporate policies for the period 2009 to 2012. The dependent variables are the first difference in the logarithm of fixed assets (Panel A: Investment), liabilities (Panel B: Leverage growth), and cash (Panel C: Liquidity growth). *Treated* is a dummy that takes a value of 1 for firms that received repayment in Phase II (2013) and zero for firms that received repayment a year earlier in Phase I. *Year 2012* is an indicator that equals 1 for year 2012. We sort our sample into firms that received a repayment shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. Robust T-statistics are shown in parentheses. ***, **, or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.001	-0.010	-0.017	-0.050***
	(0.46)	(-0.73)	(-1.60)	(-3.79)

Panel B: Leverage growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	-0.003	-0.003	0.026	0.094***
	(-0.14)	(-0.10)	(0.82)	(8.09)

Panel C: Liquidity growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	-0.002	-0.021	-0.103*	-0.284***
	(-0.11)	(-0.84)	(-1.81)	(-5.78)

Table IA.6: Summary Statistics: Bank Heterogeneity

This table reports average firm characteristics for firms in Phase I and Phase II, the differences between the two groups of firms, and the p-values associated with those differences. Phase I includes the sample of firms that worked for local government entities that received the repayment shock in year 2012, and Phase II includes firms that received the repayment shock in 2013. Firms from Phase I and Phase II are matched based on total assets and the size of the repayment shock. Panel A compares firms in Phase I and Phase II for the sample of "top banks" (e.g., firms that in 2009 worked with at least one bank with a core equity tier 1 (CET 1) capital ratio above 7.4). Panel B compares firms in Phase I and Phase II for the sample of "excluding top banks" (e.g., firms that in 2009 did not work with a top bank). Firm characteristics are all measured in year 2011.

Panel A: Excluding top banks

	(1) Phase I	(2) Phase II	(3) Difference	(4) P-value
Repayment shock	81.357	107.892	26.535	(0.771)
Investment	0.014	0.079	0.064	(0.111)
Leverage growth	-0.000	0.026	0.026	(0.369)
Liquidity growth	-0.140	-0.113	0.027	(0.664)
Total assets	2,627.548	2,748.122	120.574	(0.814)
Total liabilities	1,698.016	1,852.856	154.840	(0.721)
Cash	169.688	147.879	-21.808	(0.271)
Leverage ratio	0.400	0.439	0.039	(0.072)*
Total debt	905.104	981.637	76.533	(0.781)
Long-term debt	507.486	603.271	95.785	(0.544)
Short-term debt	314.369	271.701	-42.668	(0.511)

Panel B: Top banks

	(1) Phase I	(2) Phase II	(3) Difference	(4) P-value
Repayment shock	285.558	260.105	-25.454	(0.906)
Investment	-0.004	-0.010	-0.006	(0.883)
Leverage growth	-0.054	-0.064	-0.009	(0.813)
Liquidity growth	-0.175	-0.121	0.053	(0.621)
Total assets	11,036.557	13,316.595	2,280.038	(0.429)
Total liabilities	6,876.159	8,653.532	1,777.373	(0.375)
Cash	533.931	478.045	-55.886	(0.634)
Leverage ratio	0.319	0.297	-0.022	(0.359)
Total debt	2,880.883	3,880.738	999.855	(0.363)
Long-term debt	1,482.203	1,865.653	383.450	(0.528)
Short-term debt	1,157.321	1,625.311	467.989	(0.280)

Table IA.7: Effects on Corporate Policies: Late Payment

This table examines the effects of late payment on investment and financing policies during the accumulation of public arrears from 2009 to 2011. Firms with public arrears are matched to firms without public arrears based on total assets, investment, leverage growth, liquidity growth, financial debt growth, and accounts payable growth in the year before the analysis (2008). The treatment group consists of firms with arrears, while the control group is a re-weighted sample of firms without arrears. The weights are used to match the first and second moments of firm characteristics between the treatment and control groups. *Arrears* is a dummy variable equal to 1 for firms in the treatment group and 0 for firms in the control group. Firms are classified as having arrears if their total accumulated unpaid bills by public entities exceeded 1% of their assets in 2011. Panel A reports average firm outcomes for firms with Arrears and firms in the control group, the differences between the two groups of firms, and the p-values associated with those differences. Panel B presents the baseline results. Panel C explores bank heterogeneity, classifying firms based on whether they work with "top" banks (e.g., firms that in 2009 worked with at least one bank with a core equity tier 1 (CET 1) capital ratio above 7.4). The dependent variables include the first differences in the logarithms of fixed assets, total liabilities, cash, accounts payable, and financial debt. All regressions include interactions of *year* × *region* × *industry* fixed effects. Robust t-statistics, clustered at the firm level, are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Panel A: Summary statistics of the matched sample in 2008

Variable	(1) Arrears	(2) Control	(3) Difference	(4) P-val
Investment	0.065	0.066	0.001	(0.808)
Leverage growth	-0.021	-0.020	0.001	(0.807)
Liquidity growth	-0.283	-0.281	0.002	(0.873)
Accounts payable growth	0.045	0.045	0.000	(0.986)
Financial debt growth	0.173	0.175	0.002	(0.830)

Panel B: Baseline specification

	Investment (1)	Leverage growth (2)	Liquidity growth (3)	Acc. Payable growth (4)	Fin. debt growth (5)
Arrears	-0.003	0.009***	0.038***	0.027***	0.020***
	(-1.08)	(4.56)	(6.45)	(7.49)	(3.47)
Year x Region x Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	260844	260844	260844	260844	260844
Adjusted R^2	0.002	0.007	0.009	0.004	0.005

Panel C: Bank heterogeneity

	Investment (1)	Leverage growth (2)	Liquidity growth (3)	Acc. payable growth (4)	Fin. debt growth (5)
Top Bank=0 × Arrears	-0.007**	0.014***	0.037***	0.037***	0.010
	(-2.02)	(5.91)	(5.36)	(8.37)	(1.60)
Top Bank=1 × Arrears	0.006	-0.002	0.042***	0.003	0.043***
	(1.43)	(-0.69)	(4.17)	(0.68)	(4.31)
Year x Region x Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	260844	260844	260844	260844	260844
Adjusted R^2	0.002	0.008	0.009	0.004	0.005