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ABSTRACT

We study how late payment in public procurement affects corporate policies by analyzing a public program that unexpectedly repaid local government arrears. Our identification strategy compares firms included in the program with similar firms that were accidentally excluded. Early repayment of arrears leads to real effects and heterogeneous corporate responses. Financially unconstrained firms repay financial debt and accumulate cash, while constrained firms repay suppliers, build cash, and increase investment. This suggests that financially constrained firms can only partially offset the liquidity cost of arrears, while unconstrained firms, with better access to bank credit, fully accommodate them. The accumulation of arrears also deteriorates procurement relationships, which do not recover after repayment.

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Keywords: late payment; arrears; procurement; trade credit; liquidity; investment, leverage, corporate policies, financing constraints

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I. 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 averaged between 13% and 20% of GDP across all countries, 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 (García-Santana and Santamaría, 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]

Making payments 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 can potentially disrupt their operations. Despite the widespread occurrence of late payment in procurement, its impact on firms' policies remains relatively unexplored.[4] In this paper, we

[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 for which payment has not been made by the agreed payment date. This definition follows the trade credit literature, in which the concepts of late payment and arrears are often treated as equivalent.

[4] Late payment in trade credit is also a common phenomenon in the private sector (Cuñat and Garcia-Appendini, 2011), particularly among financially constrained firms (Giannetti et al., 2011). For example, in the U.S., 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 (see Cuñat and Garcia-Appendini (2011)). 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.

contribute to filling this gap by studying how firms manage the late payment of trade credit, particularly in the context of public procurement contracts.

The main empirical challenge is that the accumulation of arrears is often influenced by the specific circumstances of both the customer and the supplier, creating a standard endogeneity problem. To address this issue, an ideal research design would involve the unexpected repayment of arrears for a random subset of firms. We take advantage of a natural experiment that closely mimics this ideal field setting. In particular, we study 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 that allows us to examine the effects of the repayment.

We show that repayment significantly affects suppliers' corporate investment, leverage, and liquidity. However, firms exhibit heterogeneous responses, depending on their level 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 changing their financial structure, particularly by repaying financial debt. Both constrained and unconstrained firms increase their cash reserves as a buffer against potential late payment. A key insight of our paper is that, by studying the heterogeneous response to the early repayment of arrears, we are able to infer how firms manage late payment in the first place. Our findings suggest that while financially constrained firms delay investment, deplete cash, and borrow more from suppliers, financially unconstrained firms can rely on bank financing to accommodate the effects of late payment. We conclude by examining how late payment affects procurement contracting and show that the accumulation of arrears damages 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 the 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 payment for public projects to encourage prompt repayment and ease the financial strain that delayed payments can place on the private sector.[6] Although the establishment of penalties and late payment interest incentivizes on-time payments, state comptrollers still routinely report delays in the payment of procurement invoices. Similarly, in China, the accumulation of arrears by local governments and their impact on corporations remains a significant issue and a topic of ongoing national debate.[7]

In 2012, the Spanish government introduced a major repayment program, unexpectedly repaying nearly €30 billion in overdue regional government arrears to approximately 135,000 suppliers–an unanticipated cash injection for these suppliers.[8] However, a group of firms was accidentally excluded from the program due to a legal oversight that omitted those with contracts involving groups of municipalities, known as *mancomunidades*. These firms eventually received payment in 2013. Importantly, both included and excluded firms were comparable in their characteristics prior to 2012. The unexpected nature of the program, combined with the presence of a naturally exogenous control group, provides an ideal setting to study the effects of late payment.

We start our empirical analysis by documenting that the repayment of public arrears has significant real effects. Our identification strategy relies on both a natural control group and

[5]This directive mandates that whenever payments from governments to businesses are not completed within 30 days, creditors must be allowed 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 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 legal interest begins to accrue 45 days after the public entity receives a proper request for payment. Total interest 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.

variation in treatment intensity, consistently comparing outcomes to firms that were equally exposed to government arrears but did not receive repayment in 2012. Intuitively, firms' responses should be stronger the larger the repayment they receive. To capture this variation, in our main analysis, we sort treated firms into four groups based on the ratio of repayment to total assets, using thresholds at 1%, 5%, and 10%. The results reveal a monotonic relationship between repayment intensity and firm response, lending further support to our identification strategy. Economically, firms receiving a repayment equivalent to at least 10% of their assets increase investment by 13%, reduce leverage by 10%, and expand cash reserves by 34%. These effects, measured relative to equally exposed firms that did not receive repayment in 2012, are both statistically and economically significant, corresponding to approximately 27%, 23%, and 31% of a standard deviation in firm investment, leverage, and liquidity growth, respectively. Overall, the program offers valuable insights into the real effects of reducing government arrears and injecting liquidity into the corporate sector.

Conceptually, late payment in trade credit should not substantially affect firm behavior if firms have access to liquidity. This implies that late payment becomes relevant only when financial frictions are present. In developed economies, government late payment involves minimal default risk, as suppliers are almost always guaranteed eventual payment. Given this low risk, firms in a frictionless financial market should remain unaffected by late payment, as they can borrow against public invoices by using them as collateral in factoring contracts with banks. However, with financial frictions, these delays can still influence corporate policies. Regulatory constraints and banks' own liquidity limitations may restrict the availability of factoring contracts. Moreover, factoring activity varies across banks. We show that banks in a stronger financial position expanded their factoring activity relative to more constrained institutions. Better-capitalized banks are also able to extend other forms of credit to their customers, helping them meet liquidity needs induced by the accumulation of public arrears.

We proxy financial constraints using firms' predetermined exposure to 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 increased investment following the liquidity injection, while also reducing accounts payable. This suggests that trade credit may act as a substitute for bank financing, though it remains insufficient to fully prevent declines in investment. It also highlights how government arrears can be propagated through supply chains via trade credit. These findings indicate that constrained firms had previously delayed investment opportunities, indicating that large government arrears can disrupt real operations. In contrast, financially unconstrained firms did not increase investment after the repayment program but instead reduced financial debt. This suggests that such firms were able to borrow against accounts receivable, other forms of collateral, or anticipated cash flows. Moreover, all firms increase cash reserves after the repayment–either to restore depleted funds or as a precaution against future late payment.[9]

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

Our study relates to several strands of the literature. First, we contribute to the literature

[9]We provide complementary evidence by stepping outside the 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 our main findings and corroborate them through the use of a completely different research design.

on the financial aspects of procurement. Procurement provides firms with stable income during recessions (Goldman, 2020). Lee (2021) finds that firms that are particularly dependent on procurement tend to grow more–especially those that are financially constrained. 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. Our paper also examines the negative effects of procurement, although we focus in particular on the consequences of late payment.

This paper also contributes to the trade credit literature. While the late payment of trade credit is well documented (Petersen and Rajan, 1994; Cuñat and Garcia-Appendini, 2011), relatively few contributions examine its determinants and its consequences for firms. The theoretical literature emphasizes the role of trade credit as insurance for buyers with whom suppliers have specific relationships (Cuñat, 2007; Wilner, 2001). This may 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. Still, 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 highlight the key role of financing constraints (Ersahin et al., 2024; Giannetti, 2024). We also contribute to the

limited 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 payment 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 payment) 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), who analyze a smaller but more persistent change. Additionally, we focus on the interaction between late payment and financing constraints.

Our paper also contributes to the literature on 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 study an unconventional form of fiscal policy in which the government borrows from banks to accelerate the repayment of accumulated arrears. Although aggregate government liabilities remain unchanged, this policy has real effects, particularly for financially constrained firms.

The rest of the paper is organized as follows. Section II. provides an analytical framework and background information on the institutional setting. Section III. describes the data.

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

Section IV. presents the empirical strategy and results. Section V. discusses the role of financing frictions. Section VI. examines the effects of late payment on procurement contracts. Section VII. concludes.

II. Analytical background and institutional setting

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

A. 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 face 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 of obtaining 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 in this paper is to evaluate whether this holds. Specifically, we examine whether the accelerated 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 asset (cash) in the balance sheet of supplier firms. In principle, if arrears generate their own collateral and liquidity, this fiscal policy should have no effect. 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 do not adequately protect firms against illiquidity. In the next section, we provide some arguments for 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 level, 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 need for liquidity. The firms that have to postpone investment due to liquidity problems should increase investment after the repayment.[11]

[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).

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. All of these elements are present in our empirical design, which we describe in more detail in the next sections.

B. Trends in public procurement and arrears

The Spanish economy was hit by a severe credit crunch between 2008 and 2013, triggered by the global financial crisis (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 levels, 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 to almost €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 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 the payment of invoices by selling them to banks at a discount. Banks often have a right of 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

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

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 substantially. All this evidence, together with a context in which firms exhibited increased demand for liquidity, suggests that the sizable reduction in factoring was largely driven by supply factors. Some of the issues that may have induced factoring to shrink were 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 required 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).

C. An unconventional fiscal stimulus

The Spanish central government approved the *Plan de Pago a Proveedores* or *Supplier Payment Program* (SPP) to provide liquidity to the suppliers of regional and local governments. The program established a new state-owned vehicle, the Fund for Financing Payments to Suppliers (FFPS), in March 2012. The FFPS borrowed €30 billion via a syndicated loan issued by 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. The program was implemented in two phases. Phase I, launched in 2012, covered the initial round of repayments to approximately 135,000 suppliers with outstanding claims as of year-end 2011. Phase II, introduced in 2013, extended coverage to roughly 5,000 additional

suppliers who had been excluded from Phase I due to an administrative oversight.

In exchange for their debts being repaid, regional and local governments owed the corresponding amounts to the central government 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 lead to additional liabilities for 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 to suppliers while incurring new debt to the central government. Firms substituted one asset (invoices) for another asset (cash). 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 directly.

D. 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 program.

Spanish municipalities may channel some or all of their purchases through *mancomunidades*. These are legal pools made up of several municipalities engaged in procurement that seek to achieve economies of scale. 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 Phase I firms and those paid in the second round 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 had similar exposure to the public sector and public arrears; they were 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]

III. 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 we provide summary statistics.

A. Data sources

Our analysis is based on proprietary data from the Instituto de Crédito Oficial (ICO), which tracks firm participation in Spain's FFPS. The ICO provides invoice-level information, including payment amounts and dates, and links these records to firm financial statements from the Iberian Balance Sheet Analysis System (SABI).[14]

[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 participated only in Phase I as the treatment group (e.g., Firm A in the figure) and firms that participated only in Phase II as the control group (e.g., Firm B in the figure). Note that any firms that appeared in both Phase I and Phase II are filtered out (e.g., Firm C in Figure IA.4).

[14]SABI is maintained by INFORMA D&B in collaboration with Bureau Van Dijk and compiles financial filings from the Spanish business register. It covers nearly all incorporated firms in Spain, excluding the self-employed and firms with minimal operations.

The initial sample excludes self-employed individuals, single-employee businesses, publicly listed companies, public sector entities, religious institutions, and nonprofit organizations. Firms that received payments in both phases of the program were also filtered out. The resulting ICO-SABI matched dataset includes 61,036 firms from Phase I and 592 firms from Phase II, representing approximately 45% of all suppliers originally included in the program and accounting for nearly 70% of total funds disbursed.

To construct a balanced panel for estimation, we impose further restrictions. We exclude firms with missing values for any of the three key outcome variables (investment, leverage growth, and liquidity growth). We also manually drop firms that would end up absorbed by the high-dimensional fixed effects if they were included in the sample, as they offer no identifying variation. The final estimation sample, restricted to the 2009–2012 period, consists of 38,370 firms from Phase I and 490 firms from Phase II. Together, these firms account for approximately €5.5 billion in total funds disbursed under the FFPS.

For our analysis of public procurement contracts, we rely on the Opentender database, which is matched to the ICO records. Opentender provides detailed information on public procurement, including contractor and customer identifiers, as well as contract amounts and descriptions.

We supplement these sources with data on municipal and regional accounts from the Spanish Finance Ministry. Data on the business turnover index and factoring (unpaid bills of exchange) are drawn from the Spanish Statistical Office. Finally, we track media coverage of Phase I and Phase II using Factiva, which provides broad coverage of Spanish news outlets.

B. Summary statistics

Table 1 reports descriptive statistics for firms in our estimation sample over the pre-shock period (2009–2011).[15] The table includes variables related to firm size, investment, liquidity,

[15] Continuous variables are winsorized at the 0.1st and 99.9th percentiles.

and financing activity, as well as the magnitude of arrears repaid under the program. The total amount of arrears for each firm reflects unpaid invoices issued to local and regional governments. In line with the structure of the program's payments, any debts owed to the central government were deducted to obtain the effective repayment transferred from the ICO.

Panel A of Table 1 shows that the average firm in Phase I received a repayment of €156,652 and had total assets of €7.5 million, while Phase II firms were somewhat larger, with average assets of €9.8 million and received an average repayment of €143,711. Investment, liquidity growth and financing variables also display substantial dispersion, with standard deviations above 40% for investment and leverage growth, and over 100% for liquidity growth.

Table 2 presents t-tests for differences in means for Phase I versus Phase II firms over the pre-shock period (2009–2011). Differences across all key observables are statistically indistinguishable from zero. The p-value for investment is 0.752; for leverage growth, 0.615; for liquidity growth, 0.882; for accounts payable growth, 0.980; and for financial debt growth, 0.677. This close balance across observable firm characteristics supports the interpretation of the staggered repayments as plausibly exogenous with respect to firm fundamentals.

IV. Accelerated repayment and corporate policies

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

A. Empirical strategy

We estimate the causal effect of accelerated repayment of government arrears by exploiting a natural experiment created by the staggered implementation of Spain's SPP. Due to a legal omission in the original legislation, some firms contracting with entities involving multiple

municipalities (mancomunidades) were excluded from the initial round of repayment and instead received repayment approximately one year later. This administrative distinction generates two groups of firms that are similar in observables and arrears exposure, but differ in the year in which they were repaid: Phase I firms received repayment between May and July 2012, while Phase II firms were paid in August 2013.

This setting provides a quasi-experimental environment to assess the effects of an exogenous liquidity shock. Because repayment timing was determined by the legal status of the contracting municipality rather than firm characteristics, differences in outcomes observed in 2012 can be attributed to the earlier receipt of funds. The identifying assumption is that, in the absence of repayment, the two groups would have followed parallel trends. We assess this assumption empirically using pre-treatment outcomes and later augment the design with reweighting and synthetic control techniques to strengthen identification.

We begin with the following difference-in-differences specification:

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

where y_{jt} denotes the outcome for firm j in year t. Our main outcomes are the first differences in the logarithm of fixed assets (investment), total liabilities (leverage growth), and cash holdings (liquidity growth). The variable $Treated_j$ equals one for firms in Phase I and zero for firms in Phase II. $Year_{2012}$ is a dummy that equals one for the year of repayment in Phase I (2012) and zero otherwise. The vector Λ includes fixed effects for the interaction of year, industry, and region, which absorb the post indicator and flexibly control for time-varying shocks at those levels. Standard errors are clustered at the firm level.

The coefficient of interest, β, captures the differential change in outcomes for Phase I firms in 2012 relative to Phase II firms. Because the only difference between the two groups is the timing of the repayment, this coefficient identifies the causal effect of early repayment on firm

policies, subject to the assumption of parallel pre-trends.[16]

To assess heterogeneity in responses, we exploit variation in the size of the liquidity shock across firms. Specifically, we sort Phase I firms into four groups based on the ratio of repayment to total assets, using thresholds at 1%, 5%, and 10%. If repayment reduces liquidity constraints, we expect firms receiving larger shocks to exhibit stronger responses in investment, deleveraging, and cash accumulation.

To ensure comparability across treatment bins, we use entropy balancing to construct a separate control group for each Phase I subgroup. The method re-weights firms in Phase II so that the first moment of the repayment-to-assets ratio matches that of the corresponding Phase I group. Both treatment and control firms have therefore the same average exposure to late payment but only Phase I firms are repaid early.

To account for time-invariant unobserved heterogeneity, we also estimate specifications that include firm fixed effects. This is particularly important if firms differ in persistent characteristics such as size, credit access, or other practices that influence both financial outcomes and sensitivity to liquidity shocks. With firm fixed effects the identification relies only on within-firm variation over time.

Finally, we estimate a synthetic difference-in-differences (SDiD) model following Arkhangelsky et al. (2021), to relax the parallel trends assumption. This estimator matches each treatment firm with a weighted average of control firms to closely match the pre-treatment outcome trajectories. This exercise provides a robustness check that is less sensitive to functional form and trend assumptions.

B. Effects of repayment on firm financial policies

We begin by analyzing the effects of the central government's repayment of arrears on firms' investment, leverage growth, and liquidity growth. To isolate the impact of the liquidity shock,

[16]This effect may be attenuated if Phase II firms partially anticipated repayment and adjusted accordingly.

we estimate the baseline specification in Equation 1 using the full sample of Phase I and Phase II firms, without accounting for treatment intensity or applying reweighting methods.

Table 3 presents the estimated effects of repayment on the three outcome variables. All regressions include fixed effects for the interaction of year, industry, and region to absorb differential time trends across sectors and geographies. Standard errors are clustered at the firm level to account for within-firm correlation and heteroscedasticity.[17]

We find that treated firms significantly increase both investment and cash holdings in the year of repayment. On average, investment rises by more than 5% and liquidity growth by nearly 12% relative to the control group. In contrast, there is no statistically significant change in leverage growth.

In Table 4 we show year-by-year effects. The coefficient on the treatment indicator interacted with each pre-treatment year (2009–2011) provides a direct test of the parallel trends assumption. Across all three variables, we find no significant differences between treated and control firms before the repayment year. The interaction term for 2012 confirms the main effect and closely aligns with the estimates reported in Table 3, both in magnitude and statistical significance.

C. Heterogeneous effects by treatment intensity

The baseline specification estimates the average effect of repayment across all treated firms. While informative, this approach gives equal weight to firms receiving modest and substantial repayments, despite the fact that only the latter are likely to experience a meaningful change in financial conditions. If repayment reduces liquidity constraints, its effects should vary with the size of the shock. In particular, firms with relatively small arrears are less likely to

[17]To focus on economically meaningful treatment variation, we exclude Phase I firms with very small repayment amounts relative to assets. These firms represent the bottom decile of the repayment distribution and are unlikely to have experienced an economically significant change in financial conditions. In the next subsection, we explicitly account for treatment intensity by grouping firms according to the size of the repayment shock.

adjust corporate policies, while those with larger exposures may respond more. Furthermore, aggregating across all treatment sizes may attenuate the estimated effects, contributing to the more moderate average treatment impacts reported in Table 3.

To assess the role of treatment intensity, we exploit variation in the size of the repayment shock across firms. We sort Phase I firms into four groups based on the ratio of repayment to total assets, using thresholds at 1%, 5%, and 10%. These cutoffs allow us to explore how firm responses vary along the distribution of repayment exposure. Firms in the lowest repayment bin serve almost as a natural placebo group. Since the liquidity shock is minimal, we do not expect to observe systematic changes in corporate policies.

To improve comparability between treated and control firms within each treatment bin, we implement an entropy balancing procedure. For each Phase I subgroup, we reweight the full set of Phase II firms to match the first moment of the repayment-to-assets ratio. The set of Phase II firms, specifically re-weighted to match the average conditioning variable (repayment-to-assets) within each intensity bin, is the control group of each of the bins. This ensures that firms being compared are similar in their exposure to arrears and that differences in outcomes are not driven by selection into bins. We continue to include fixed effects for the full interaction of year, industry, and region, and we cluster standard errors at the firm level throughout.

The results for investment are shown in Panel A of Table 5. Investment increases with the size of the repayment, with no significant effect for firms in the lowest bin and larger effects in the higher ones. The response is strongest for firms with repayment shocks above 10% of assets, which increase investment by 13% relative to their matched Phase II counterparts. This corresponds to about 27% of the standard deviation of investment growth among Phase I firms. These findings are consistent with the idea that public arrears constrained investment and that repayment allowed firms to pursue previously deferred investment opportunities. The pattern is consistent with prior evidence that financially constrained firms reduce investment

during periods of limited liquidity and resume it once constraints are relaxed (Campello et al., 2010). The pattern also implies that firms did not treat unpaid invoices as fully substitutable for cash or credit, which casts doubt on the idea that arrears can serve as a reliable form of collateral.

Leverage responses appear in Panel B. We find little change in debt levels for firms with smaller repayment shocks, but a significant decline for those in the top group. Firms that received repayments above 10% of assets reduced leverage growth by 10% relative to the control group. In economic terms, this change represents approximately 23% of the standard deviation of leverage growth in the Phase I sample. The result is consistent with firms using the repayment to reduce outstanding liabilities after having relied on debt to bridge liquidity shortfalls during the arrears period. This is in line with evidence that firms tend to increase borrowing when access to internal funds is restricted, and subsequently reduce leverage once liquidity conditions improve (Ivashina and Scharfstein, 2010).

Cash holdings display a similar pattern, as shown in Panel C. Firms in the top treatment group accumulate significantly more cash following repayment, increasing their holdings by 34% compared to the matched controls. This increase amounts to roughly 33% of the standard deviation in liquidity growth. The accumulation of cash suggests that firms did not immediately redeploy all received funds into investment or debt reduction. Instead, some of the repayment was retained, possibly as a precautionary buffer or to preserve flexibility for future operational or strategic decisions. This behavior is consistent with models in which constrained firms value internal liquidity and accumulate cash in response to positive cash flow shocks (Almeida et al., 2004). Holding additional cash may provide insurance against future financial stress or enable greater flexibility in investment and operations.

Taken together, these results show a clear relationship between the size of the repayment and corporate responses. Across investment, leverage, and cash holdings, the estimated effects strengthen as the size of the repayment increases. The absence of statistically significant effects

for firms in the lowest treatment group and the monotonicity of the estimated coefficients indicate that arrears is the mechanism that links the exogenous shock to liquidity with the outcomes; thus reinforcing the identification strategy. In the following section, we assess the robustness of these findings using alternative empirical approaches.

D. Alternative specifications

To assess the robustness of our baseline findings, we estimate two alternative specifications. First, we incorporate firm fixed effects to control for time-invariant, unobserved heterogeneity at the firm level. Second, we implement the SDiD estimator developed by Arkhangelsky et al. (2021), which is robust to violations of the parallel trends assumption and allows for treatment effect heterogeneity across units and over time.

Table 6 reports results from the specification that extends Equation 1 to include firm fixed effects. We retain the interaction of year, industry, and region fixed effects to account for common shocks at those levels, while the firm fixed effects absorb persistent differences across firms that may be correlated with both treatment intensity and corporate outcomes. This specification helps mitigate concerns that our baseline estimates are biased due to omitted variables that are stable over time but vary across firms.

Panel A of Table 6 reports the investment results. Investment rises monotonically with the size of the repayment shock. Firms receiving repayments above 10% of assets increase investment by about 10% relative to comparable Phase II firms. The effect is statistically significant and consistent with binding liquidity constraints prior to repayment. Firms appear to use the cash to restart or expand capital spending. Panel B reports leverage. Leverage falls only for firms with the largest arrears. Those receiving repayments above 10% of assets reduce leverage growth by roughly 10%. The decline is statistically significant at the 5% level. We do not find significant changes for smaller shocks. Panel C reports cash holdings. Firms with moderate shocks (above 5% of assets) begin to accumulate cash, and those with shocks

above 10% raise cash holdings by more than 35% relative to the control group. These increases are statistically significant. A portion of the repayment is therefore kept as cash rather than immediately allocated to investment or debt repayment. This response is consistent with precautionary saving: rather than immediately reallocating all incoming funds to investment, debt repayment, or distribution, firms choose to retain part of the cash.

Taken together, these results show that the size of the repayment shock matters for how firms adjust their corporate policies. Firms with the largest repayment exposures respond across the three dimensions: they invest more, reduce leverage, and accumulate cash. Firms facing smaller shocks show weaker or no adjustments. The results remain robust when we control for firm fixed effects, indicating that the estimated effects are not driven by time-invariant firm characteristics correlated with repayment exposure.

As a further robustness check, we estimate treatment effects using the SDiD approach of Arkhangelsky et al. (2021). This estimator constructs a synthetic control group that replicates the pre-treatment trends of the treated firms by reweighting a set of comparison units. Unlike conventional DiD, SDiD places greater emphasis on matching the trajectory of outcomes over time, giving more weight to observations close to the treatment window. This flexibility makes SDiD particularly useful in our setting, where the number of Phase II firms is relatively small and where pre-treatment outcome dynamics may differ slightly across firms.

In this exercise, we treat firms in Phase II as the "treated" group and use Phase I firms as the donor pool to construct a synthetic comparison. This makes the donor pool bigger and improves the quality of the synthetic firms. Weights are chosen to minimize firm-by-firm discrepancies in outcome trends during the pre-treatment period. The difference between observed post-repayment outcomes and their synthetic counterparts yields the estimated treatment effects. The results, shown in Table IA.1, are broadly consistent with those from the firm fixed effects specification. Investment rises significantly for firms with larger repayment shocks, leverage falls among firms most exposed to arrears, and cash holdings increase in line

with the shock size. The fact that these patterns persist under an alternative identification strategy lends additional credibility to our main findings.

Overall, these robustness checks confirm that our results are robust to the choice of specification or control strategy. Whether using firm fixed effects or the SDiD estimator, the evidence consistently shows that repayment of accumulated arrears has significant monotonic effects on firms' investment, financing, and liquidity policies, particularly among those most exposed to late payment.

V. The role of financing frictions

The results presented so far indicate that firms exposed to government arrears delay investment and may rely on external borrowing to sustain operations. Following repayment, these firms accumulate liquidity, a response that is consistent with the presence of financial frictions and costly uncertainty associated with delayed payment. In this section, we extend the previous empirical analysis by conditioning on firms' financial constraints to examine how the effects of accelerated repayment vary across firms with different levels of access to credit. Implicitly, this section also sheds some light on the role of financing frictions in shaping the response of firms to government arrears in the first place.

A. Measuring financing constraints

In a frictionless financial market, firms should be able to borrow against the value of unpaid invoices and would not need to distort their investment policy. However, if financial frictions limit firms' ability to raise external funds, then delayed payments from the public sector may force firms to cut back investment or increase leverage. Figure 2 illustrates this friction. In 2007, the volume of factoring transactions in Spain exceeded 30% of GDP, but following the onset of the financial crisis, it declined steadily, falling to roughly one-third of its pre-crisis

level. This decline was considerably larger than the fall in aggregate economic activity, as proxied by the business turnover index, and suggests that financial intermediation became more constrained during this period.

To assess whether the impact of repayment depends on firms' access to credit, we examine heterogeneity by financing constraints. Our proxy for financial constraints is based on the strength of firms' bank relationships. Bank–firm relationships are generally persistent over time and informative about credit access (Petersen and Rajan, 1994; Santos and Winton, 2008; Darmouni, 2020). Previous research has documented that the financial crisis had an uneven impact on Spanish banks, which in turn affected their corporate clients (Bentolila et al., 2018; Jimenez et al., 2014).

We classify a firm as linked to a "top bank" if it had at least one relationship in 2009 with a bank that was relatively healthy during the crisis period.[18] Specifically, we define top banks as those with a core equity tier 1 (CET1) capital ratio above 7.4% of risk-weighted assets under the adverse scenario in the 2011 stress tests conducted by the European Banking Authority (EBA).[19] This threshold corresponds to the average CET1 ratio across Spanish banks under the EBA's adverse scenario and serves as a measure of resilience and lending capacity during the crisis.

Consistent with this classification, Figure IA.5 in the Appendix shows that factoring transactions involving SPP arrears declined more sharply among non-top banks. While overall factoring activity shrank during the crisis, top banks were able to maintain a relatively higher volume of factoring, suggesting that firms connected to stronger banks retained better access to liquidity.

To assess the role of financing frictions, we estimate the specification in Equation 1

[18] If the company does not report any bank relationship in 2009, we use the last available report before 2009. If there is no information before 2010, we use the 2010 data.

[19] Stress test results are publicly available at: https://www.bde.es/wbe/en/noticias-eventos/otros-temas-interes/pruebas-resistencia-sector-bancario-europeo/

separately for firms classified as connected to top banks and those that are not. Table IA.2 in the Appendix shows that, within each banking group, Phase I and Phase II firms do not exhibit significant differences before the shock, supporting the validity of the comparison. We also split Phase I firms by treatment intensity into two bins, distinguishing between firms receiving repayments below 5% of total assets and those receiving more than 5%. This allows us to focus on the differential response of firms facing greater exposure to arrears. Firms in the higher repayment group are the most exposed and therefore the most likely to respond to repayment, consistent with the treatment heterogeneity documented in Section C.. In contrast, the lower repayment group serves as a benchmark, capturing firms that are less affected by late payment. As before, we then use entropy balancing to construct a separate control group for each of the four Phase I subgroups. The control group in each bin is constructed in two steps. First, it selects firms in Phase II that share the same with/without banks status as the Phase I firms. Second, it reweights these firms using entropy matching so that the distribution matches the first moment of the conditioning variable, repayment-to-assets, of the bin.

This setup allows us to examine whether firms with weaker banking relationships are more affected by government arrears and react more to the repayment. If financing frictions amplify the effects of delayed payments, we should observe a stronger response in investment among firms with high repayment exposure and more limited access to bank credit.

B. Financing constraints

Firms without access to top banks–those more likely to be financially constrained–respond strongly to the repayment shock by increasing investment. Among firms receiving a large repayment (above 5% of assets), those lacking relationships with top banks increase investment by nearly 12%, as shown in Panel A of Table 7. In contrast, firms with links to top banks do not exhibit a significant investment response, despite having accumulated similar arrears. These results are consistent with repayment relaxing a binding liquidity constraint for the

more constrained firms, enabling them to fund projects that had previously been postponed due to insufficient liquidity. In contrast, firms with stronger bank access react in a way that is consistent with them being able to continue investing despite the arrears, relying on credit lines or bank borrowing to smooth cash flows.

The leverage results in Panel B provide further support for this interpretation. Firms with top-bank relationships reduce their liabilities significantly after receiving repayment, with an average decline in leverage growth of 11%. This reduction reflects the repayment of liabilities previously incurred to offset the delay in public payments. By contrast, financially constrained firms show no significant change in leverage, consistent with the idea that they were unable to borrow from banks in the first place. Together, these patterns highlight the asymmetry in how firms use the liquidity shock: constrained firms use it to expand investment, while unconstrained firms use it to reduce leverage. The latter pattern is also consistent with unconstrained firms having already committed funds to investment earlier and now reallocating liquidity towards reducing leverage.

Both groups accumulate cash following repayment, but the increase is larger for firms with top-bank relationships. As shown in Panel C, these firms increase cash holdings by 32.5%, compared to 21.9% among financially constrained firms. Prior research has documented that both financially constrained and unconstrained firms increase their cash holdings in response to adverse shocks, although the underlying motives may differ. Constrained firms tend to accumulate cash out of internal funds as a precaution against future financing frictions, consistent with the cash flow sensitivity of cash described by Almeida et al. (2004). In contrast, unconstrained firms are more likely to build cash buffers to preserve strategic flexibility or to take advantage of investment opportunities in uncertain environments (Duchin et al., 2010; Campello et al., 2010).

C. Financial debt and trade credit

In this section, we examine the effects of the repayment of arrears on financial debt and on accounts payable. This distinction between bank borrowing and trade credit sheds light on how firms managed liquidity shortages during the build-up of arrears in the first place.

Panel A of Table 8 focuses on financial debt growth. Firms with top-bank relationships reduce financial debt significantly following repayment, supporting the view that they had previously relied on bank borrowing to offset delayed payments. The reduction in financial debt for unconstrained firms implies that the leverage decline documented in Panel B of Table 7 is consistent with an active effort to reduce the debt contracted in earlier periods. In contrast, firms without top-bank access show no significant change in financial debt, which is consistent with these firms lacking access to bank credit during the arrears period and being unable to substitute towards formal debt markets.

Panel B shows the effect on accounts payable. Here, we find that financially constrained firms significantly reduce their supplier obligations following repayment, while unconstrained firms do not. This pattern suggests that constrained firms resorted to trade credit as a substitute for financial debt during the arrears period.[20] Once liquidity is restored, they use the repayment to reduce outstanding payables. These findings are consistent with the view that financially constrained firms rely on their suppliers to smooth cash flow when facing borrowing constraints (Garcia-Appendini and Montoriol-Garriga, 2013). They also support the idea that liquidity shocks can propagate along supply chains, affecting upstream firms through delayed payment behavior (Alfaro et al., 2021; Boissay and Gropp, 2013).

Overall, these results emphasize that financing frictions are important in determining the response of firms to delayed government payments. Financially constrained firms, without

[20]Note that accounts payable make up about one quarter of total leverage on average. It is not contradictory to find a significant reduction in accounts payable while the change in total leverage is not statistically significant. The reduction in accounts payable falls well within the confidence interval for the change in total leverage.

access to strong banking relationships, use the repayment shock to increase investment and reduce supplier debt, suggesting that they had trouble financing investments before. This finding also indicates that taking trade credit or factoring invoices may both serve as an alternative to bank debt for constrained firms, although it is not enough to completely offset their reductions in investment. In contrast, unconstrained firms had better options to borrow from banks before, and now use the repayment to reduce debt and increase cash buffers. The asymmetry in responses highlights how identical policy shocks can have different economic consequences depending on the firms' access to finance. Moreover, the generalized increase in cash holdings suggests that firms, regardless of prior constraints, treat government arrears as a persistent risk and adjust their liquidity accordingly.

D. Firm responses to late payment

In the previous sections, we analyzed firm responses to the accelerated repayment of arrears, using the timing of the policy shock to infer how firms had adjusted their financial decisions during the period of delayed payments. As a complementary analysis, we now turn to more direct descriptive evidence on firm behavior during the build-up of public arrears.

Specifically, we examine investment and financing policies over the 2009-2011 period by comparing firms exposed to public arrears with a reweighted random sample of nearly 200,000 Spanish firms that were not exposed to public arrears.[21] We construct weights to match the first and second moments of total assets and the five key outcome variables in 2008 between the two groups. Panel A of Table IA.3 shows that the matched sample is well balanced across the five key outcome variables, with no statistically significant differences between treatment and control firms in 2008.

Panel B of Table IA.3 presents the baseline results. Each coefficient represents the average

[21] Following our earlier analyses, again we make use of the intensity of treatment. We classify firms as having arrears if their total unpaid invoices from the public sector exceeded 5% of their assets in 2011, and exclude firms below this threshold since they are only marginally treated.

difference in the dependent variable between the two groups during the 2009-2011 period. All regressions include year-by-region-by-industry fixed effects. Firms exposed to public arrears invest less and increase both leverage and accounts payable relative to firms not exposed to public arrears.

In Panel C, we examine heterogeneity by access to finance. We separate the sample based on whether firms worked with at least one top bank. The results show that the reduction in investment is concentrated among firms without top-bank relationships. These financially constrained firms do not substitute toward bank financing and instead rely more heavily on supplier credit. In contrast, firms with top-bank access maintain investment levels and increase bank borrowing. These findings are consistent with those reported in Sections B. and C., and further emphasize the importance of financing constraints in shaping firm responses to delayed payments. Firms with access to credit markets are able to absorb the liquidity shock caused by arrears, while constrained firms are forced to cut investment and extend their payables.

While the design in this section differs from that used in our main identification strategy–both in terms of the comparison group and the underlying assumptions–the results are highly consistent. The consistency of findings across distinct empirical approaches provides additional support for the interpretation that government arrears have real effects on firm policy decisions, especially for firms with limited access to finance.

From a policy perspective, the results in this section highlight the effect of delayed public procurement payments in terms of trade credit. The liquidity constraints caused by arrears distort firm-level financial decisions and propagate across supply chains when constrained firms extend more account payables to their own suppliers. This behavior can create an amplification channel that may exacerbate downturns or delay recovery. Our findings suggest that repayment programs like the FFPS can play a stabilizing role by restoring liquidity to firms that are unable to self-insure against payment risk. More broadly, the evidence highlights the importance of prompt payment practices and targeted liquidity support, particularly in

environments where financial frictions are severe or bank lending remains segmented. In this context, repayment policies should account for the heterogeneity in firms' financial positions.

VI. Arrears and public procurement contracting

In this section, we study how delayed payments from public administrations influence procurement contracting within a firm–customer relationship. Several effects could be at play. Firms with existing arrears may prefer to continue contracting with the same public customers to maintain leverage in recovering overdue payments. Alternatively, firms may reduce or sever ties with such customers if they view payment delays as a signal of continued financial unreliability.[22]

To examine these effects, we exploit a setting in which each observation captures new procurement contracts at the firm, customer, and year level. We extend the sample of Phase I firms to include other firms that contract with local governments but for which our data do not report any arrears. This allows us to compare a firm's contracting behavior with different municipalities–some with and some without late payments–while controlling for demand conditions at the local level and supply-side variation at the firm level.

We merge data from the ICO-SABI dataset with the Opentender database, a comprehensive source of public procurement contracts across Europe.[23] We aggregate Opentender contract-level data to the firm–municipality–year level, treating each firm-municipality pair as a potential contracting relationship throughout the sample period (2009–2012). If a contract occurs in a given year, we record it; otherwise, the pair is coded as not contracting. We end up with a balanced panel of municipality-firm pairs in which each pair contracts at least once during the sample period. We then merge these data with ICO records of public arrears, resulting in a

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

[23]Opentender includes only contracts exceeding a sector- and buyer-specific size threshold. The median contract in our sample is approximately €350,000, substantially larger than those reported in ICO.

panel with detailed information on both procurement outcomes and prior unpaid obligations between firms and municipalities.[24]

We hypothesize that arrears with a given municipality influence a firm's procurement decisions with that municipality. To identify this effect, we compare the same firm's behavior toward municipalities with and without arrears exposure, while absorbing broader firm-level and location-level shocks. Specifically, we include firm × year fixed effects to control for supply-side variation, and municipality × year fixed effects to control for local procurement demand.[25]

Our estimating equation is as follows:

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

Here, $Contract_{jit}$ denotes either an indicator for a new procurement contract or the log of one plus the value of all contracts between firm j and municipality i in year t. The main independent variable is $Arrears_{ji}$, which we define in two ways. In our baseline, it is a dummy equal to one if firm j had accumulated arrears with municipality i at the end of 2011. In alternative specifications, we use the ratio of arrears to firm assets, capturing the relative importance of the unpaid obligations.[26]

The coefficients of interest are β_{2011} and β_{2012}, capturing how prior arrears affect contracting during the peak of the payment crisis and the year of repayment. We include 2009 and 2010 to test for pre-trends; since most arrears accumulated in 2011, we expect smaller effects in

[24] When we merge arrears, we restrict the analysis to Phase I firms, which were exposed to repayment in 2012, for comparability with our previous treated sample.

[25] Controlling for local demand is important, as shown by García-Santana and Santamaría (2023), who document strong home bias in procurement. Similarly, Ricca et al. (2020) find that politically connected firms receive faster payments, and Ferraz et al. (2015) show that winning public contracts improves future bidding success—underscoring the bilateral and persistent nature of procurement relationships.

[26] To focus on economically meaningful variation, we exclude firm-municipality pairs with very small arrears relative to firm size. These cases fall in the bottom 5% of the arrears-to-assets distribution and are unlikely to reflect payment delays large enough to affect procurement decisions.

those earlier years. Standard errors are clustered at both the firm and municipality levels.

The results are shown in Table 9. In Columns 1 and 2, the dependent variable is an indicator for whether a new contract is signed between the firm and municipality. We find that in 2011, firms with arrears were about 22% less likely to initiate a new contract with the municipality that had not paid them. In Columns 3 and 4, we analyze the total value of contracts. In 2011, arrears were associated with a 3% reduction in contract size. When using the continuous arrears-to-assets measure in Columns 2 and 4, the results confirm the baseline pattern. Each additional 1% of arrears relative to assets is associated with a 3.3% lower likelihood of contracting and a 0.45% decrease in the total value of contracts. This specification helps capture variation in the intensity of arrears across firm-municipality pairs and shows that both the presence and scale of late payment affect procurement behavior.

Turning to the post-repayment year, we find no significant rebound in 2012. For example, in Column 3 the 2011 coefficient indicates a 6.5% decrease in a probability of a contract, while in 2012 it shows a non-statistically-significant reduction of 1.3%. While repayment may have halted further deterioration, we see no evidence of a compensating recovery in new contracting. The absence of a positive coefficient suggests that commercial relationships damaged by late payment were not restored. This pattern points to a form of hysteresis: once a firm reduces or exits a public customer relationship due to nonpayment, it does not immediately re-engage, even after the financial stress is resolved.

These results show how late payment practices can affect the resilience of firm-government relations. Late payment is associated with a decline in procurement activity. The effect stops after underlying arrears are repaid, but the broken commercial links between firms and the government are not restored. From a policy standpoint, while fiscal programs that accelerate repayment can prevent further disruption, they may be insufficient to repair broken relationships. The results suggest that protecting supplier confidence through reliable payment practices may be more effective than trying to restore trust retroactively.

VII. Conclusion

We study the effect of government arrears on firms' policies. We exploit, as a natural experiment, a large accelerated repayment by the government in Spain in 2012. Using a unique data set and a clean causal identification strategy, we find that firms' corporate decisions are significantly affected by the unexpected government repayment program.

The effects of repayment differ depending on firms' access to finance. Financially unconstrained firms respond by reducing leverage and accumulating cash, but do not increase investment. In contrast, financially constrained firms use the liquidity to boost investment and reduce trade payables, suggesting that repayment helped alleviate binding financial frictions. These patterns imply that less constrained firms bridge liquidity gaps through external borrowing, while more constrained firms absorb the shock by cutting investment and delaying payments to their suppliers. Our results thus highlight an important spillover effect of the policy through trade credit channels. Implicitly, our research also sheds light on firms' inability to collateralize public arrears, thereby contributing to the sparse literature on financial factoring.

Taken together, our results show that government arrears have substantial effects on firm decisions. The risks associated with delayed payments can distort firm behavior, especially for firms facing tight financing constraints. These findings contribute to the literature on the financial aspects of public procurement and extend research on trade credit and liquidity shocks. We also speak to the limited literature on factoring, showing that firms often cannot use public receivables as effective collateral during periods of financial stress.

From a policy perspective, our results provide important insight into the effectiveness of an unorthodox fiscal policy that does not change overall public liabilities but has important real effects. Early repayment of arrears affects corporate investment and has heterogeneous effects across firms.

Our findings also underscore the impact of the late payment by public administrations on procurement contracting. We see that firms burdened with substantial arrears tend to shrink from contracting with the public sector. The repayment of the arrears stops the deterioration of the contracting between firms and public administrations but does not restore the lost links. These relationships and their impact on public procurement contracts deserve further attention, given their significant implications for both firms and public entities.

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Figure 1: Analytical Framework

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

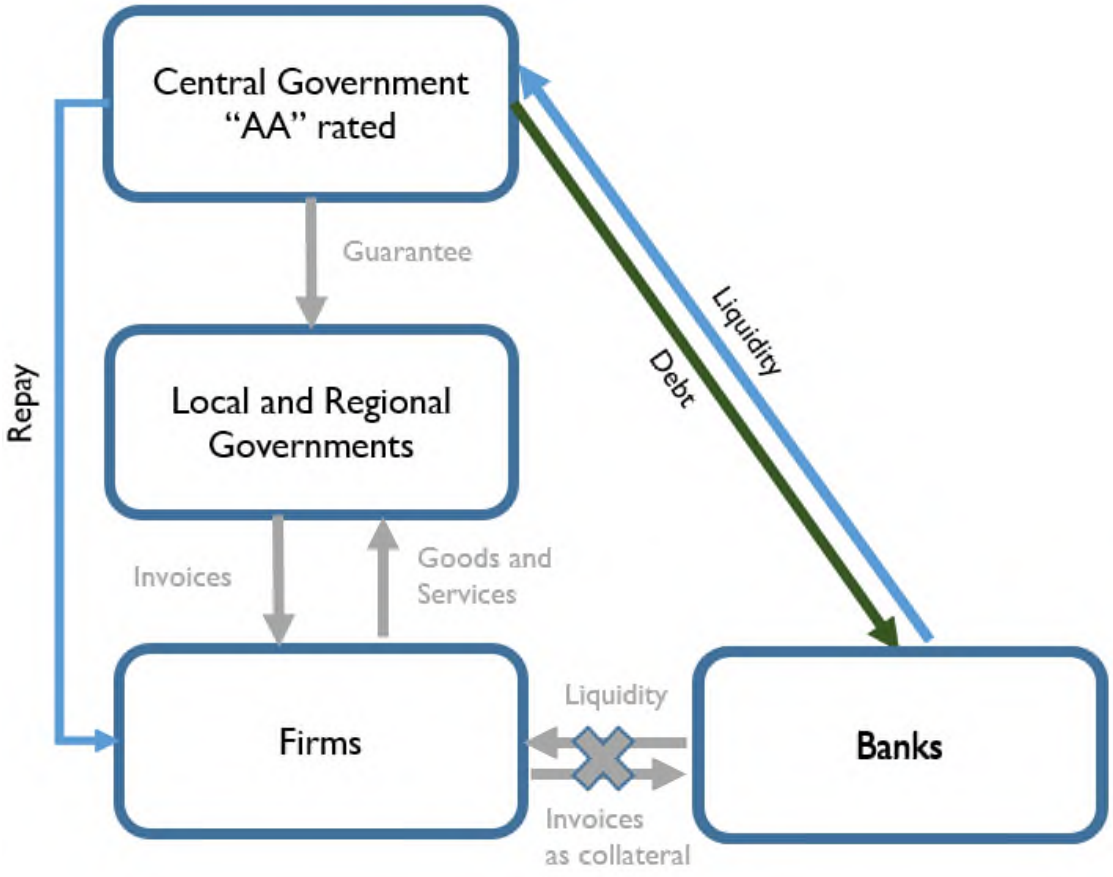


Figure 2: Factoring and Business Turnover Index

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.

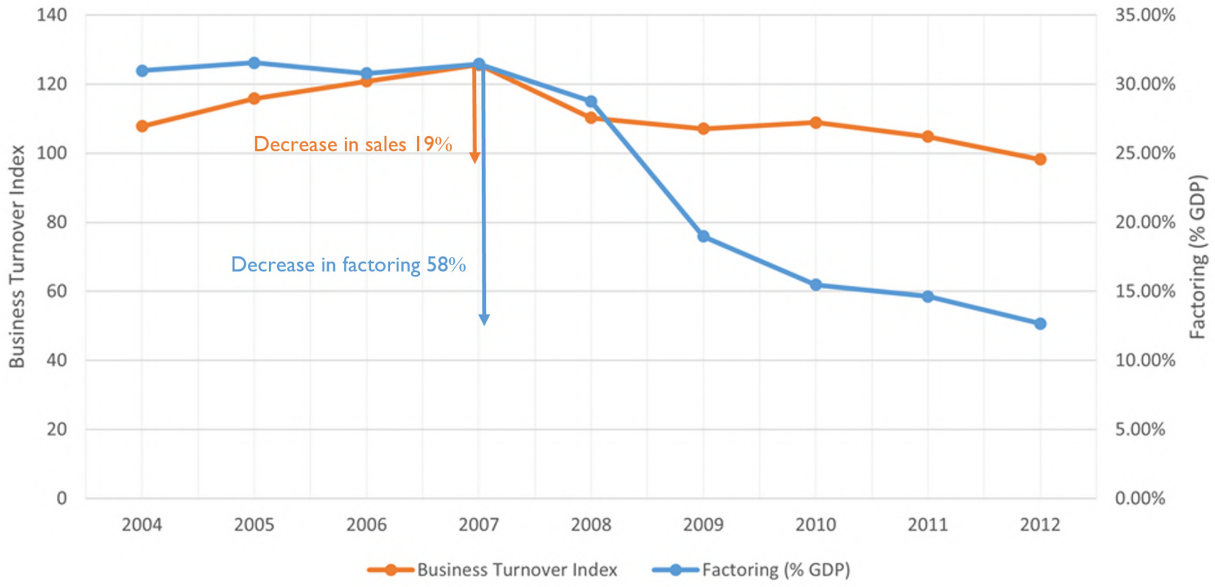


Table 1: Descriptive Statistics

This table reports summary statistics including the mean, standard deviation, 10th, 25th, 50th (median), 75th, and 90th percentiles, as well as the number of observations, for the firm-level variables used in our main analysis. Panel A covers Phase I firms in the pre-shock period 2009 to 2011, and Panel B covers Phase II firms over the same period. Phase I includes the sample of firms that worked for local government entities that received the repayment shock in 2012, and Phase II includes firms that received the repayment shock in 2013.

Panel A: Phase I Firms

	mean	sd	p10	p25	p50	p75	p90
Repayment ('000s EUR)	156.652	931.255	1.904	4.071	13.492	51.441	199.213
Total Assets ('000s EUR)	7546.607	41906.702	224.000	421.000	992.000	2846.000	9547.000
Investment (%)	2.569	48.141	-27.599	-12.703	-3.110	7.504	37.103
Leverage Growth (%)	-0.854	43.618	-39.433	-17.584	-1.772	14.098	37.157
Liquidity Growth (%)	-5.008	109.234	-129.781	-60.614	-3.792	47.859	117.866
Accounts Payable Growth (%)	-3.746	65.209	-63.229	-27.890	-2.385	20.560	52.535
Financial Debt Growth (%)	-4.148	85.501	-69.315	-30.074	-7.551	15.125	67.841

Panel B: Phase II Firms

	mean	sd	p10	p25	p50	p75	p90
Repayment ('000s EUR)	143.711	1422.580	0.418	1.066	2.685	8.991	29.263
Total Assets ('000s EUR)	9834.343	56956.401	159.000	372.000	872.000	2519.000	10978.000
Investment (%)	3.027	48.960	-27.323	-11.886	-2.963	6.454	34.294
Leverage Growth (%)	-0.126	49.035	-40.344	-16.360	-1.557	13.436	42.286
Liquidity Growth (%)	-5.461	103.046	-120.984	-54.232	-4.196	44.381	109.164
Accounts Payable Growth (%)	-3.796	68.463	-73.137	-31.237	-4.013	20.344	57.753
Financial Debt Growth (%)	-2.912	78.973	-69.530	-28.768	-7.707	15.810	73.967

Table 2: T-Test Results - Differences in Means Between Phase I and Phase II Firms

This table reports average firm characteristics for firms in Phase I and Phase II, the differences between the two groups, and the p-values associated with those differences. The sample covers the pre-shock period from 2009 to 2011.

Variable	Phase I	Phase II	Difference	P-val
Repayment ('000s EUR)	156.652	143.711	-12.941	(0.757)
Total Assets ('000s EUR)	7,546.607	9,834.343	2,287.736	(0.173)
Investment (%)	2.569	3.027	0.458	(0.752)
Leverage Growth (%)	-0.854	-0.126	0.728	(0.615)
Liquidity Growth (%)	-5.008	-5.461	-0.453	(0.882)
Accounts Payable Growth (%)	-3.746	-3.796	-0.050	(0.980)
Financial Debt Growth (%)	-4.148	-2.912	1.236	(0.677)

Table 3: Effects on Corporate Policies

This table presents estimates from panel regressions explaining corporate policies over the period 2009 to 2012. The dependent variable in Column 1 is the first difference in the logarithm of fixed assets (Investment); in Column 2, it is the first difference in the logarithm of total liabilities (Leverage growth); and in Column 3, it is the first difference in the logarithm of cash (Liquidity growth). *Treated* is an indicator variable equal to one for firms that received repayment in Phase I (2012) and zero for those that received repayment a year later in Phase II. *Year 2012* is an indicator variable for the year 2012. All columns include *year* × *region* × *industry* fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Investment (1)	Leverage Growth (2)	Liquidity Growth (3)
Treated	-0.005	-0.001	-0.000
	(0.015)	(0.014)	(0.024)
Treated × Year 2012	0.054**	-0.032	0.117**
	(0.027)	(0.033)	(0.058)
Year x Region x Industry FE	Yes	Yes	Yes
Observations	112,067	112,067	112,067
R^2	0.008	0.019	0.016

Table 4: Dynamic Effects on Corporate Policies

This table presents estimates from panel regressions explaining corporate policies over the period 2009 to 2012. The dependent variable is the first difference in the logarithm of fixed assets (Investment) in Column 1, the first difference in the logarithm of total liabilities (Leverage growth) in Column 2, and the first difference in the logarithm of cash (Liquidity growth) in Column 3. *Treated* is an indicator variable equal to one for firms that received repayment in Phase I (2012) and zero for those that received repayment a year later in Phase II. *Year 2009*, *Year 2010*, *Year 2011*, and *Year 2012* are indicator variables for the corresponding years. All columns include *year* × *region* × *industry* fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Investment (1)	Leverage Growth (2)	Liquidity Growth (3)
Treated × Year 2009	0.017	0.028	0.088
	(0.020)	(0.021)	(0.054)
Treated × Year 2010	0.007	-0.020	-0.032
	(0.024)	(0.027)	(0.051)
Treated × Year 2011	-0.038	-0.008	-0.050
	(0.031)	(0.027)	(0.055)
Treated × Year 2012	0.049**	-0.032	0.117**
	(0.023)	(0.030)	(0.051)
Year x Region x Industry FE	Yes	Yes	Yes
Observations	112,067	112,067	112,067
R^2	0.008	0.019	0.016

Table 5: Effects on Corporate Policies: Intensity of Repayment

This table analyzes corporate policies over the period 2009 to 2012. The dependent variables are the first difference in the logarithm of fixed assets (Panel A: Investment), total liabilities (Panel B: Leverage growth), and cash (Panel C: Liquidity growth). *Treated* is a dummy equal to one 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 II are reweighted to match the ratio of the repayment shock to total assets. *Year 2012* is an indicator variable for the year 2012. We sort the sample into four groups based on the size of the repayment shock: below 1% of total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include *year* × *region* × *industry* fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Investment

	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated	-0.007	-0.007	0.002	-0.004
	(0.015)	(0.014)	(0.016)	(0.017)
Treated × Year 2012	0.011	0.056*	0.083***	0.131***
	(0.022)	(0.029)	(0.030)	(0.031)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Observations	51,859	39,828	14,588	17,898
R^2	0.055	0.055	0.092	0.166

Panel B: Leverage growth

	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated	0.007	-0.012	-0.016	-0.025
	(0.012)	(0.016)	(0.019)	(0.023)
Treated × Year 2012	-0.057	0.012	0.012	-0.096**
	(0.038)	(0.039)	(0.040)	(0.039)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Observations	51,859	39,828	14,588	17,898
R^2	0.092	0.096	0.149	0.301

Panel C: Liquidity growth

	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated	0.017	0.006	-0.013	-0.008
	(0.025)	(0.024)	(0.026)	(0.025)
Treated × Year 2012	-0.008	0.027	0.125**	0.339***
	(0.063)	(0.058)	(0.064)	(0.066)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Observations	51,859	39,828	14,588	17,898
R^2	0.080	0.075	0.084	0.109

Table 6: Effects on Corporate Policies: Firm Fixed Effects

This table analyzes corporate policies over the period 2009 to 2012. The dependent variables are the first difference in the logarithm of fixed assets (Panel A: Investment), total liabilities (Panel B: Leverage growth), and cash (Panel C: Liquidity growth). *Treated* is a dummy variable equal to one 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 II are reweighted to match the ratio of the repayment shock to total assets. *Year 2012* is an indicator variable for the year 2012. The sample is sorted into four groups based on the size of the repayment shock: below 1% of total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include *year* × *region* × *industry* fixed effects and firm fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Investment

	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.001	0.045	0.061**	0.103***
	(0.023)	(0.028)	(0.030)	(0.030)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	50,851	38,647	14,072	17,096
R^2	0.366	0.376	0.389	0.446

Panel B: Leverage growth

	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	-0.045	0.021	0.012	-0.098**
	(0.036)	(0.039)	(0.042)	(0.041)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	50,851	38,647	14,072	17,096
Adjusted R^2	0.370	0.374	0.403	0.528

Panel C: Liquidity growth

	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.027	0.047	0.134**	0.347***
	(0.064)	(0.059)	(0.066)	(0.069)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	50,851	38,647	14,072	17,096
R^2	0.233	0.235	0.232	0.257

Table 7: Effects on Corporate Policies: Bank Heterogeneity

This table analyzes corporate policies over the period 2009 to 2012 across bank types. *Treated* is a dummy variable equal to one for firms that received repayment in Phase I (2012) and zero for those that received repayment a year later in Phase II. *Year 2012* is an indicator variable for the year 2012. The sample is divided according to the size of the repayment shock and bank capitalization. Specifically, firms are grouped by whether they received a repayment shock below or above 5% of total assets and whether they were connected to a top bank. The "top banks" sample includes all firms that, in 2009, worked with at least one bank with a core equity tier 1 (CET1) capital ratio above 7.4. The "excluding top banks" sample includes all other firms. In Panel A, the dependent variable is the first difference in the logarithm of fixed assets (Investment). In Panel B, it is the first difference in the logarithm of total liabilities (Leverage growth). In Panel C, it is the first difference in the logarithm of cash (Liquidity growth). Firms from Phase I and Phase II are matched within each group based on the ratio of the repayment shock to total assets. All regressions include *year* × *region* × *industry* fixed effects and firm fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Investment

	Top Banks		Excluding Top Banks	
	$< 5\%$	$> 5\%$	$< 5\%$	$> 5\%$
Treated × Year 2012	-0.025	-0.051	0.041	0.117***
	(0.031)	(0.046)	(0.033)	(0.035)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	30736	7363	57277	22311
R^2	0.381	0.319	0.395	0.443

Panel B: Leverage growth

	Top Banks		Excluding Top Banks	
	$< 5\%$	$> 5\%$	$< 5\%$	$> 5\%$
Treated × Year 2012	0.008	-0.112**	-0.017	-0.039
	(0.045)	(0.046)	(0.048)	(0.052)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	30736	7363	57277	22311
R^2	0.422	0.528	0.398	0.482

Panel C: Liquidity growth

	Top Banks		Excluding Top Banks	
	$< 5\%$	$> 5\%$	$< 5\%$	$> 5\%$
Treated × Year 2012	0.038	0.325**	0.056	0.219***
	(0.108)	(0.141)	(0.066)	(0.074)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	30736	7363	57277	22311
R^2	0.298	0.330	0.244	0.253

Table 8: Financial Debt and Accounts Payable

This table explores leverage over 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 variable equal to one for firms that received repayment in Phase I (2012) and zero for those that received repayment a year later in Phase II. *Year 2012* is an indicator variable for the year 2012. The sample is divided according to the size of the repayment shock and bank capitalization. Specifically, firms are grouped by whether they received a repayment shock below or above 5% of total assets and whether they were connected to a top bank. The "top banks" sample includes all firms that, in 2009, worked with at least one bank with a CET1 capital ratio above 7.4. The "excluding top banks" sample includes all other firms. Firms from Phase I and Phase II are matched within each sample split based on the ratio of the repayment shock to total assets. All regressions include *year* × *region* × *industry* fixed effects and firm fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Financial debt growth

	Top Banks		Excluding Top Banks	
	$< 5\%$	$> 5\%$	$< 5\%$	$> 5\%$
Treated × Year 2012	-0.126**	-0.287***	0.009	-0.107
	(0.058)	(0.109)	(0.098)	(0.095)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	22514	4826	38273	13375
R^2	0.405	0.294	0.334	0.339

Panel B: Accounts payable growth

	Top Banks		Excluding Top Banks	
	$< 5\%$	$> 5\%$	$< 5\%$	$> 5\%$
Treated × Year 2012	0.029	-0.033	-0.052	-0.128**
	(0.062)	(0.086)	(0.053)	(0.061)
Year x Region x Industry FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	30486	7279	56543	21909
R^2	0.345	0.740	0.320	0.383

Table 9: Effects on Public Procurement

This table presents estimates from panel regressions explaining firms' public procurement decisions over the period 2009 to 2012. The unit of observation is at the firm–municipality–year level. In Columns 1 and 2, the dependent variable is a dummy equal to one if a new contract is established between a firm and a municipality, and zero otherwise. In Columns 3 and 4, the dependent variable is the natural logarithm of one plus the total value of all contracts awarded to the firm by the municipality in that year. In Columns 1 and 3, *Arrears* is a dummy equal to one if the firm had accumulated arrears with a municipality by the end of 2011, and zero otherwise. In Columns 2 and 4, *Arrears* is defined as the ratio of the firm's arrears with a municipality to its assets at the end of 2011. *Year 2009*, *Year 2010*, *Year 2011*, and *Year 2012* are indicator variables for the corresponding years. All regressions include *year* × *firm* and *year* × *buyer municipality* fixed effects. Robust standard errors are clustered at both the firm and municipality levels and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Contract (I)		Contract (*Size*)	
	Arrears (I)	Arrears (*Size*)	Arrears (I)	Arrears (*Size*)
	(1)	(2)	(3)	(4)
Arrears × Year 2009	0.213	0.003	3.239	0.025
	(0.156)	(0.020)	(2.096)	(0.304)
Arrears × Year 2010	0.125	0.026	1.695	0.370
	(0.102)	(0.023)	(1.378)	(0.293)
Arrears × Year 2011	-0.222**	-0.033**	-3.069**	-0.449***
	(0.097)	(0.014)	(1.336)	(0.159)
Arrears × Year 2012	-0.073	-0.029	-0.650	-0.355
	(0.147)	(0.033)	(1.904)	(0.440)
Year x Firm FE	Yes	Yes	Yes	Yes
Year x Buyer FE	Yes	Yes	Yes	Yes
Observations	3,972	3,972	3,972	3,972
R^2	0.191	0.190	0.176	0.175

Internet Appendix:
"Government Arrears and Corporate Policies: Lessons from a Natural Experiment"

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

In this appendix section, 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: Effects on Corporate Policies: SDiD
- Table IA.2: Summary Statistics: Bank Heterogeneity
- Table IA.3: Effects on Corporate Policies: Late Payment

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

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 monthly from January 2011 to December 2013. Source: Factiva.

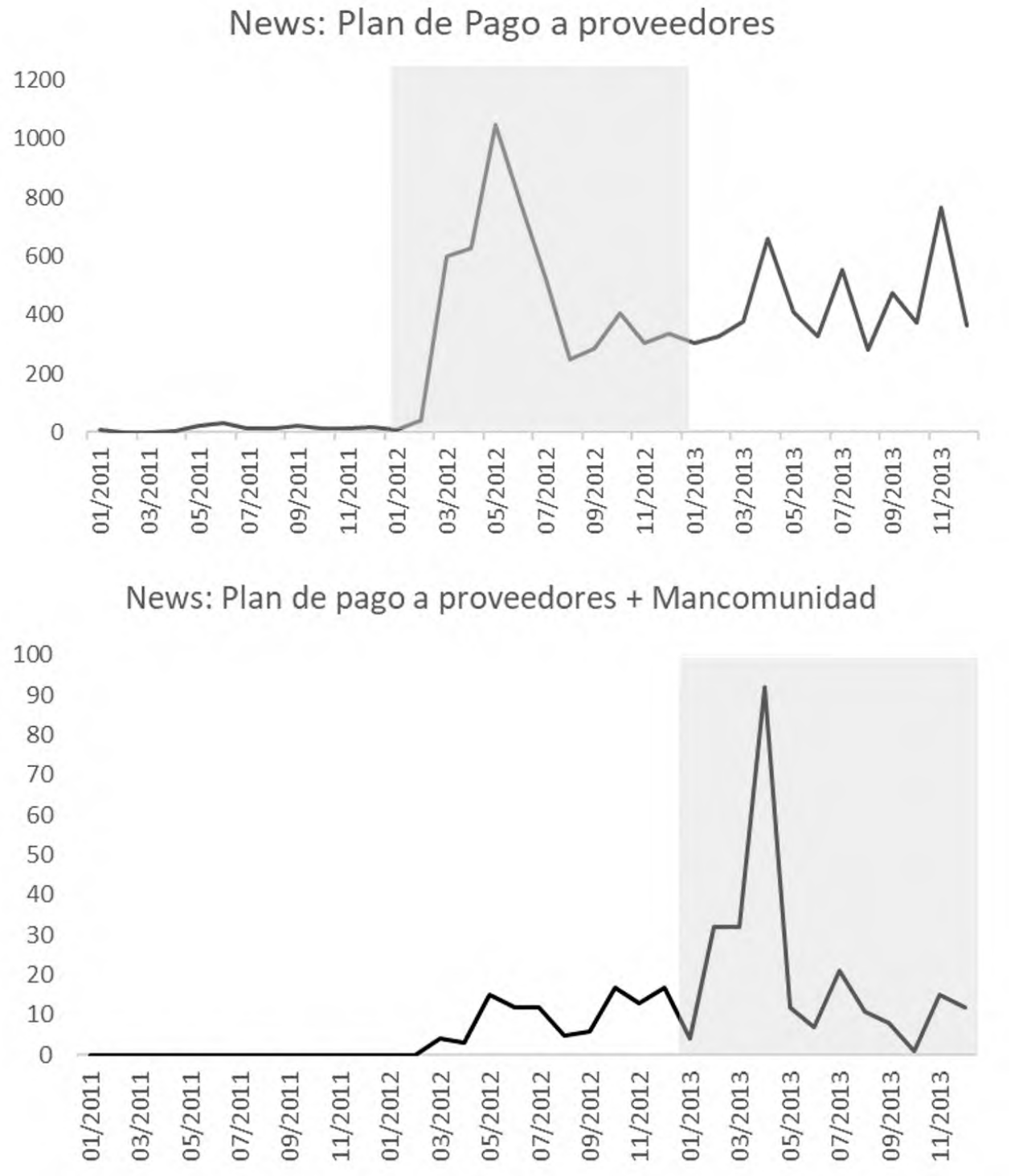


Figure IA.2: Average Payment Delay (days) Per Sector, 2005–11

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.

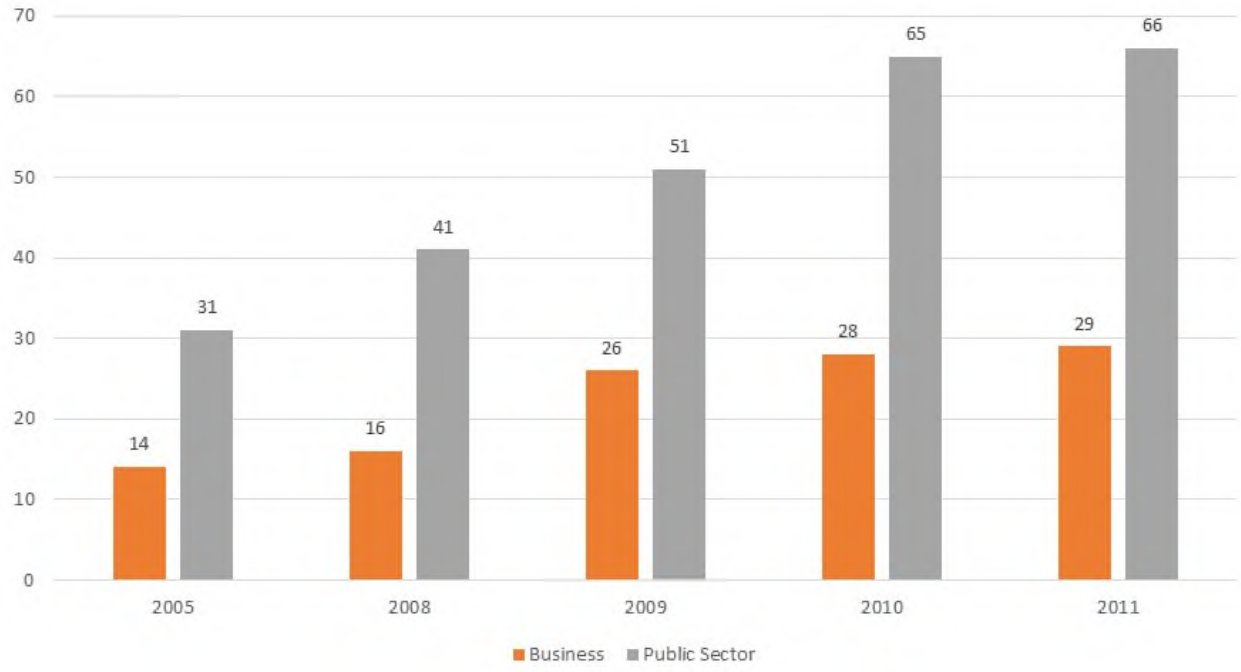
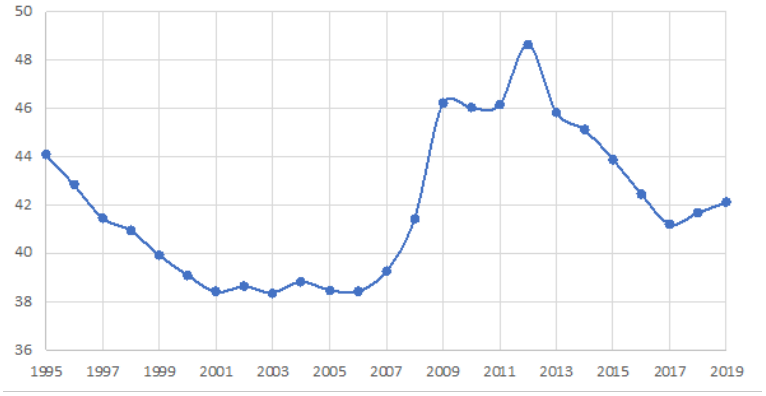


Figure IA.3: Spanish Municipalities

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)

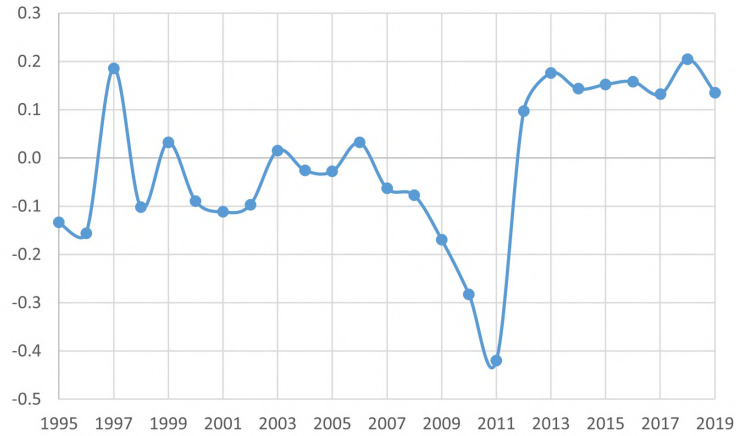


Figure IA.4: Mancomunidades and Municipalities

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.

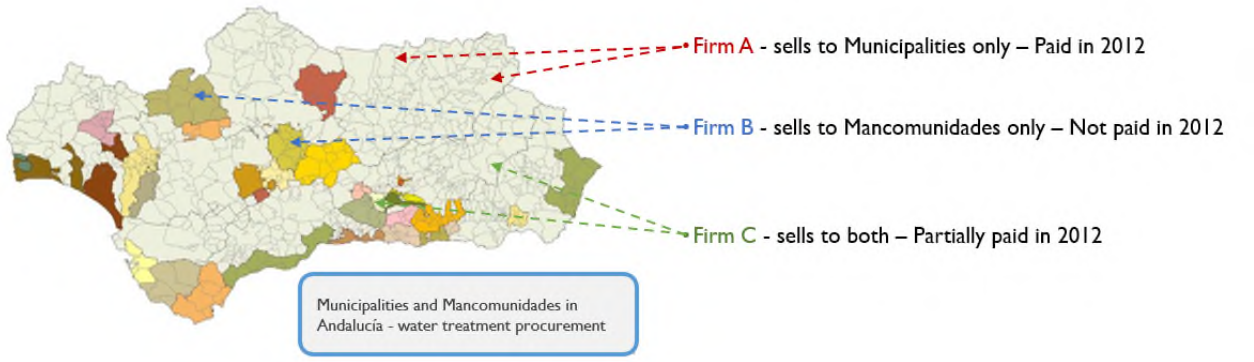


Figure IA.5: Factoring of Arrears by Bank Type

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 CET 1 capital ratio above 7.8 in the EBA stress tests developed in 2011. Non-top banks include banks with a 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.

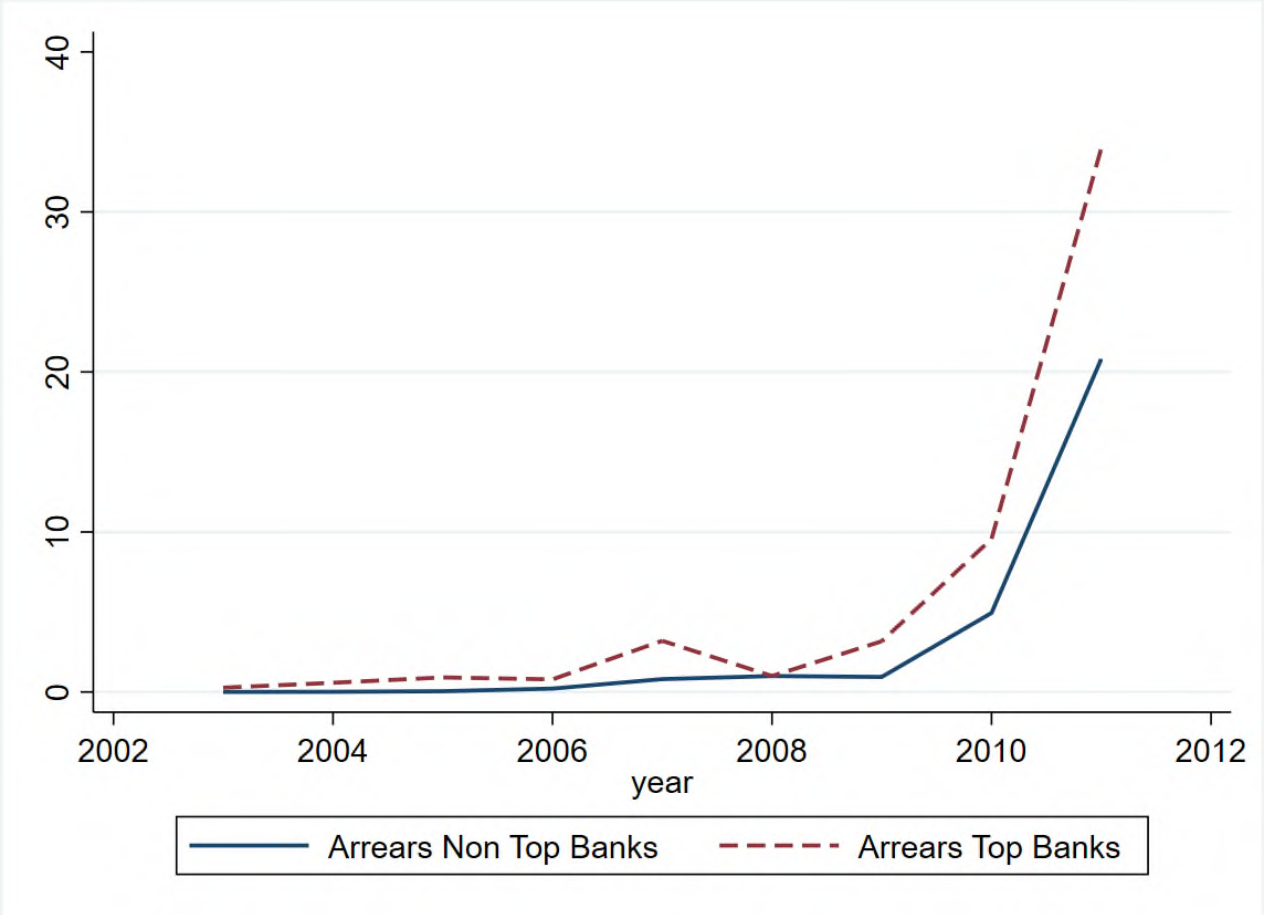


Table IA.1: Effects on Corporate Policies: SDiD

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 one 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 the 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 standard errors 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	0.017	0.002	-0.014	-0.035***
	(0.019)	(0.032)	(0.048)	(0.013)

Panel B: Leverage growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	0.014	0.010	0.039	0.168***
	(0.023)	(0.029)	(0.053)	(0.058)

Panel C: Liquidity growth

Arrears/Assets →	$< 1\%$	$1\% - 5\%$	$5\% - 10\%$	$> 10\%$
Treated × Year 2012	-0.017	-0.023	-0.137***	-0.439***
	(0.084)	(0.024)	(0.040)	(0.078)

Table IA.2: 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 2012, and Phase II includes firms that received the repayment shock in 2013. 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 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 were all measured in 2011.

Panel A: Top banks firms

Variable	Phase I	Phase II	Difference	P-val
Repayment ('000s EUR)	291.961	239.584	-52.377	(0.781)
Total Assets ('000s EUR)	16,132.979	31,155.197	15,022.219	(0.198)
Investment (%)	-0.333	-1.254	-0.921	(0.813)
Leverage Growth (%)	-6.155	-6.442	-0.287	(0.943)
Liquidity Growth (%)	-17.678	-10.525	7.154	(0.517)
Accounts Payable Growth (%)	-10.222	-10.880	-0.658	(0.868)
Financial Debt Growth (%)	-5.121	2.529	7.650	(0.404)

Panel B: Excluding top banks firms

Variable	Phase I	Phase II	Difference	P-val
Repayment ('000s EUR)	95.143	78.011	-17.133	(0.770)
Total Assets ('000s EUR)	3,522.546	2,988.254	-534.292	(0.443)
Investment (%)	1.613	6.970	5.358	(0.166)
Leverage Growth (%)	-1.123	1.470	2.593	(0.431)
Liquidity Growth (%)	-14.565	-11.738	2.828	(0.655)
Accounts Payable Growth (%)	-4.906	-4.234	0.672	(0.869)
Financial Debt Growth (%)	-5.360	-3.941	1.419	(0.782)

Table IA.3: 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 arrears based on 2008 firm characteristics, including total assets, investment, leverage growth, liquidity growth, financial debt growth, and accounts payable growth. The treatment group consists of firms with arrears, while the control group is a re-weighted sample of firms without arrears. The weights match the first and second moments of firm characteristics between the treatment and control groups. *Arrears* is a dummy variable equal to one for firms in the treatment group and zero for those in the control group. Firms are classified as having arrears if their total unpaid bills from public entities exceeded 5% of their assets in 2011. Panel A reports average firm outcomes for firms with arrears and those in the control group, along with the differences between the two groups and the associated p-values. Panel B presents the baseline regression results. Panel C explores heterogeneity based on bank characteristics, classifying firms according to whether they worked with a "*top bank*" in 2009 (defined as a bank with a CET1 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 *year* × *region* × *industry* fixed effects. Robust standard errors clustered at the firm level are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Panel A: Summary Statistics (2008)

Variable	Arrears	Control	Difference	P-val
Investment	0.052	0.052	-0.000	(0.975)
Leverage growth	-0.003	-0.005	-0.002	(0.706)
Liquidity growth	-0.094	-0.103	-0.009	(0.573)
Accounts payable growth	-0.221	-0.211	0.010	(0.515)
Financial debt growth	0.059	0.053	-0.007	(0.658)

Panel B: Baseline (2009–2011)

	Investment	Leverage growth	Liquidity growth	Accounts payable growth	Financial debt growth
Arrears	-0.015***	0.012***	0.006	0.025***	0.010
	(0.003)	(0.003)	(0.007)	(0.005)	(0.007)
Year x Region x Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	267,335	267,335	267,335	267,335	267,335
R^2	0.006	0.011	0.014	0.006	0.009

Panel C: Bank heterogeneity (2009–2011)

	Investment	Leverage growth	Liquidity growth	Accounts payable growth	Financial debt growth
Top Bank=0 × Arrears	-0.019***	0.016***	0.012	0.032***	0.004
	(0.004)	(0.003)	(0.008)	(0.006)	(0.008)
Top Bank=1 × Arrears	-0.004	0.004	-0.007	0.007	0.027**
	(0.006)	(0.005)	(0.013)	(0.007)	(0.013)
Year x Region x Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	267,335	267,335	267,335	267,335	267,335
R^2	0.006	0.011	0.014	0.006	0.009