# Government Arrears and Corporate Decisions: Lessons from a Natural Experiment*

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**Abstract**

We study how firms respond to the repayment of accumulated arrears. We exploit as a natural experiment a large-scale financing plan of the Spanish government in 2012 that repays accumulated arrears of local governments to their suppliers (amounting to about 3% of Spain's GDP). Our identification strategy relies on comparing firms included in the first phase of the program and firms accidentally omitted but repaid a year later. Repayment significantly increases corporate investment, reduces firm leverage, and increases cash reserves. Firms linked to banks with poor financial health respond by increasing investment and repaying suppliers. Less financially constrained firms react by repaying debt. Our results highlight the negative effects of procurement arrears and their interaction with financing frictions. We also provide evidence of the effectiveness of an unconventional fiscal policy that has large real effects.

**JEL classification**: G31; G32; G38; E51
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# 1 Introduction

Government procurement, the purchase of goods and services on behalf of a public authority, accounts for a substantial part of the global economy. According to the World Bank, public procurement in 2020 represented between 13% and 20% of world GDP, while global expenditure on procurement was close to 9.5 trillion US dollars.[1] Central and subnational governments are important customers for many small local businesses, providing a more stable demand over non-public customers, especially in recession periods (Goldman, 2020). Yet, governments can be slow in payment, and arrears often accumulate. This indeed occurred during the European sovereign debt crisis that followed the global financial crisis.

While there is an extensive literature on the economics of procurement, the financial dynamics of supplier-government relationships is less explored. In this paper, we aim to fill this gap by exploiting a large-scale financing plan of the Spanish government that repaid accumulated arrears of local governments to their suppliers in two different phases. Repayment significantly affects suppliers' corporate investment, leverage, and liquidity and shows heterogeneous responses according to firm-bank linkages.

The issue of late payments by the public sector is a concern that regulators worldwide share. For instance, the European Commission issued a late-payment directive (LPD) in 2011 to standardize payment terms and establish uniform regulations. This directive mandates that payments from government to business that are not completed within 30 days should allow creditors to claim interest and recovery costs.[2] Similarly, in the U.S., States such as Illinois, New York, or Massachusetts enforce interest penalties for late payments on public projects to induce prompt repayment and to ease the financial strain that delayed payments can put on the private sector.[3] Although establishing a late payment interest incentivizes

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

[2] See Directive 2011/7/EU, On Combating Late Payment in Commercial Transactions, 2011 O.J. [L. 48], 2 for more details.

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



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early payment, state comptrollers routinely report the late payment of procurement invoices and compute the interest paid accordingly.

In developed economies, government agencies in distress may delay payments, but the default is typically unexpected, and suppliers are ultimately paid. Given this, in a frictionless financial market, firms ought to be able to borrow using their government arrears as collateral, implying that repayment speed would not alter corporate actions. Financial frictions, however, may force firms to change their plans, and the delayed payment of government arrears can thus be costly. Uncertainty about payment times can cause firms to postpone investments and avoid future procurement contracts.

We show that the accelerated payment of government arrears significantly increases corporate investment, reduces firm leverage, and increases cash reserves. The extent to which government arrears are costly to firms is a relevant empirical question linked to the presence of financing constraints. A major challenge in examining this issue empirically is that the payment terms for arrears are frequently influenced by the specific circumstances of both buyer and seller, creating a standard endogeneity problem. To address this problem, one potential approach would involve randomly accelerating the repayment of government arrears for a subset of firms, offering an unexpected intervention.

We take advantage of a natural experiment that mimics this ideal field experiment: A program in Spain in 2012 accelerated the repayment of regional government arrears. Some firms received a sizeable unexpected payment and reduced accounts receivable, while other comparable firms did not. The consequences of this program help us understand the effects of reducing government arrears and providing liquidity to firms. The effects are also informative about the cost that government arrears entail for firms and how firms have made changes in strategies to minimize these costs, given investment opportunities and financing constraints.

In 2012, the Spanish government paid overdue amounts to over 60,000 firms. In the five years before this, regional governments had accumulated arrears owed to suppliers. The volume of arrears totaled €30 billion (equivalent to 3% of Spanish GDP). In 2011, this positive

capped at 15%.



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liquidity shock had been largely unanticipated by firms.[4]

An interesting element of this liquidity injection is that the program accidentally omitted a group of firms from the initial repayment program (Phase I). Suppliers that worked for groups of municipalities (*mancomunidades*) were first overlooked. These firms were then included in an amended plan (Phase II) and received payment a year later. In total, more than 7,000 firms (with arrears amounting to around €1 billion) were paid in mid-2013 instead of in mid-2012.

The firms in Phase II are an ideal control group because they have similar characteristics and selection margins as firms in Phase I. That is, phase II firms received the liquidity shock a year later for exogenous reasons. The unexpected nature of the program and the presence of a natural exogenous control group make this liquidity injection an ideal setting to study the effects of the repayment of accumulated arrears.

Our results show that the repayment program affected corporate investment, leverage, and liquidity decisions differently for Phase I firms and Phase II firms. There were real effects associated with the accelerated payment of government arrears. In particular, we find that an unexpected liquidity shock equivalent to more than 10% of a firm's assets led firms to increase their investments by 14%, reduce their leverage by 10%, and increase their cash reserves by 44%. These measures are statistically and economically important, representing (respectively) around 30%, 20%, and 40% of the standard deviation of firm investment, leverage, and liquidity growth of the firms in the sample.

Our findings also tell us something about the actions that firms took to address the accumulation of arrears and late payments. The results suggest that firms with unpaid customer bills will likely delay investment opportunities and borrow to continue operations. The added liquidity in these firms after the repayment is consistent with the presence of financial frictions and with a costly uncertainty about future payment delays.

These results also hint at a heterogeneous response across firms and, in particular, that firms' responses should vary across the ability of firms to borrow during the accumulation of

[4]News coverage on the liquidity injection appeared for the first time in mid-January 2012. Legislation passed in March, and the payments were made between May and July. See Figure 1 for details on the news coverage.



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arrears. In principle, firms with government arrears should be able to borrow against their public invoices, using them as collateral in factoring contracts with banks. However, this is a period in which factoring activity is shrinking due to regulatory frictions and banks' liquidity constraints. We show that this effect is heterogeneous across banks and that banks that are in a better financial position expand their factoring activity relative to those that are more constrained. Firms also had the option to use other forms of borrowing to accommodate the liquidity needs implied by the accumulation of public arrears. We, therefore, extend our analysis by conditioning our results on the financial constraints of firms. We proxy financial constraints using the firms' pre-determined exposure to specific banks that got more or less affected by the crisis (See Chodorow-Reich (2014), Jimenez et al. (2014) and Bentolila et al. (2013) for a similar approach). The results show that financially constrained firms increase their investment after the liquidity injection, while they repay a small fraction of their debt. This suggests that financially constrained firms delayed investment opportunities and indicates that, in contrast with the unconstrained benchmark, large government arrears can indeed be costly to them when firms face financing constraints. Conversely, financially unconstrained firms do not increase their investments after the liquidity injection and repay a larger fraction of their debt instead. This shows that these firms were able to borrow against their collateral or future cash flows, and possibly against their accounts receivable with the local governments.

Conversely, financially unconstrained firms do not increase their investments after the liquidity injection. They accumulate cash and reduce their liabilities by a larger fraction. These firms have more opportunities to access debt by borrowing against their collateral or future cash flows, and possibly against their accounts receivable with local governments.

We also observe that firms tend to increase their cash reserves, irrespective of their financing constraints. This result is consistent with the fact that firms facing an episode of delayed payments decide to hold onto more cash to help cover future late payments and other short-term costs, even if these firms have the capacity to borrow against these unpaid bills.

Finally, we study how the repayment of accumulated government arrears affects the



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relationship dynamics between firms and public procurement. Our findings indicate that if public administrations delay their payments, their customers might be hesitant to pursue public procurement contracts with them again in the future.

Our study is linked to several strands of the literature. First, we contribute to the literature on the financial aspects of procurement. The procurement channel is helpful in providing firms with a stable income during recessions (Goldman, 2020). Di Giovanni et al. (2022) expand on this idea to show the implications of firms using their procurement relationships as a form of collateral that can ease financing constraints. Similarly, (Gabriel, 2022) shows that Portuguese firms use procurement contracts as collateral to increase their amount of lending. Bonfim et al. (2021) show a symmetric effect. When government spending is unexpectedly cut during a financial crisis, procurement-prone firms find it harder to borrow. Barrot and Nanda (2020) focus directly on the formal trade credit in procurement contracts, and show that shorter formal payment periods can have a positive effect on firms. In particular, they find a positive effect on employment when the US government accelerated payments to business contractors but only in labor markets that are not too tight. Relatedly, Checherita-Westphal et al. (2016) show that increased delays in some European governments' payments can affect the liquidity and profits of the private sector, whereas Conti et al. (2021) show that stricter regulation to minimize late payment reduces firms' exit rate. Lee (2021) shows that particularly procurement-dependent firms grow more, which is especially true for financially constrained firms. We focus specifically on government arrears rather than on the formal trade credit terms of procurement. Our natural experiment posits a large one-off reduction of arrears rather than a smaller but more persistent one. We also focus on the interaction of the late payment of arrears with financing constraints.

Second, we contribute to the literature on the different stimulus policies to channel liquidity to the corporate sector (Bach, 2014; Banerjee and Duflo, 2014). The impact of any directed policy is typically difficult to evaluate, primarily because of potential selection biases. In our natural experiment, the government effectively executes an unorthodox form of fiscal



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policy. It borrows from banks to accelerate the repayment of accumulated arrears. Even though government liabilities remain unchanged, this policy has real effects, particularly for financially constrained firms.

Finally, our work contributes to several streams of the trade credit literature. We show the potential costs for suppliers when they finance a large buyer via trade credit (Murfin and Hjorge, 2015; Klapper et al., 2012). We add to the understanding of the costs of late payment and its interaction with financing constraints. While late payment has been well documented in the literature (Petersen and Rajan, 1997), the theoretical literature focuses on its role as insurance for the buyer (Cuñat, 2007; Wilner, 2001), which is unlikely relevant in the case of public debt. Moreover, the empirical literature on late payment is so far very limited. We also contribute to the very scarce literature on trade credit factoring by implicitly showing that firms cannot discount government arrears even when the creditworthiness of the government is good.[5]

The rest of the paper is organized as follows. In Section 2, we provide an analytical framework and background information on the institutional setting for the shock. Section 3 describes the data and the construction of the main variables. The empirical strategy and results are presented in Section 4. Section 5 discusses how financing frictions may affect the results. Section 6 discusses the effects of late payment by public entities on procurement contracts, and Section 7 concludes.

# 2 Analytical framework

Our work aims to understand the real effects of delayed payment in procurement by examining how firms respond to accelerated repayment of accumulated arrears. We first describe the procurement process and the institutional setting, and we lay out the natural experiment that we use for identification purposes.

[5]See Smith and Schnucker (1994) as one of the few contributions to understanding the factoring contract.



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## 2.1 Procurement, late payment, and financing constraints

In the absence of financing constraints, late payments in procurement contracts should not significantly impact firms, as long as payments are essentially guaranteed. Firms can borrow against the future cash flows from their procurement contracts and neutralize the impact of late payments. Firms can use any form of borrowing to address late payment, but trade credit is itself a form of explicit collateral, or the commercial relationship with the government a form of implicit collateral. Therefore, any real effects stemming from late payment or from the resolution of a late payment situation will occur only if firms are unable to borrow in general or are not able to borrow against their trade credit invoices.

In the case of Spain, the procurement trade credit contracts of municipal and regional authorities are implicitly backed by the central government. One would expect that, in the absence of financing constraints, procurement invoices would mechanically produce enough collateral to finance any late payment. However, arrears may have a real impact if firms are unable to discount their invoices to the local and regional governments with the banks.

Figure 2 conceptualizes this setting. The gray arrows show the flow of funds and contracts of the different agents, while the blue and black arrows show the flows of the unconventional fiscal policy of the government. Note that the government is replacing one implicit liability with the firms with an explicit liability with the banks. So this policy does not entail any additional borrowing from the government. However, we show empirically that this policy has real effects.

In order to do so, we take advantage of an empirical setting in which several elements concur: i) an accumulation of procurement arrears, ii) a policy that repays these arrears unexpectedly, and iii) groups of comparable treatment and control firms.

## 2.2 Procurement arrears, and the financial crisis in Spain

The Spanish economy suffered a severe credit crunch that originated from the global financial crisis that developed in 2008 (Bentolila et al. 2013; Jimenez et al. 2014). The financial



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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 not left unscathed. Spain's public administrations, particularly at the municipal and regional level, experienced capital market funding problems, just like local banks, and they delayed payments to suppliers. [6]

Panel A of Figure 3 shows the evolution of municipal and regional trade credit and the arrears. There is a clear increase in the amount of trade credit used (orange line). More importantly, there is a marked increase in late payments (blue line), that is, trade credit that goes beyond its contractual maturity. The peak of total trade credit use (not yet due and on arrears) happened in 2011, just before the government intervention of 2012.[7] At the same time, municipalities increased total expenditures, exacerbating budget deficits (see Panels B and C of Figure 3). The result was that the commercial debt in arrears accumulated by regional and local governments as of December 2011 amounted almost to €30 bn (about 3% of GDP).

Simultaneously, the financial crisis created a contraction of the factoring market. The factoring market allows firms to borrow in anticipation of payment of invoices at some discount. The invoices serve as a form of collateral, and the discount implicitly determines the interest on the loan. Figure 4 compares the evolution of sales (turnover index) with the evolution of factoring loans. While sales declined by 19% between 2007 and 2012, factoring loans as a fraction of GDP fell by 58%. Note that GDP declined as well, while the prevalence and maturity of trade credit increased, so the fraction of invoices that were being factored shrank even further.

While arrears mitigated the financial constraints of regional and local governments, they also created a liquidity problem for their supplier firms that interacted with firms' financing constraints.

[6] 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 delayed payment days in the private and public sectors.

[7] Just 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.



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## 2.3 An unconventional fiscal stimulus

The Spanish central government approved the *Plan de Pago a Proveedores* (Supplier Payment Program) to alleviate these liquidity problems of suppliers to regional and local governments. The program established a new state-owned vehicle, FFPS (Fund for Financing Payments to Suppliers), that was approved through legislation passed in February and March 2012. The FFPS made payments directly to the suppliers of regional and local governments, converting their commercial debt into financial debt held by the FFPS. The FFPS was announced in mid-January 2012, and the liquidity injections occurred between May and July 2012. At that time, the Instituto de Crédito Oficial (ICO) injected €27.3 bn into the real economy. Panel C of Figure 3 shows that the financial situation of municipalities deteriorated from 2008 to 2011 but improved after the central government intervention.

Funding for regional and local governments was guaranteed by their respective shares in the pool of state tax receipts, which the government could retain in the case of non-payment. Regional and local governments paid the Spanish Treasury's funding cost plus a maximum margin of 145 basis points, favorable conditions compared to those offered in the capital markets. To prevent moral hazard, the local governments were required to submit a fiscal adjustment program to the central government.

To finance the program, the FFPS gathered funds from a syndicated loan worth €30 bn, with the option to go up to €35 bn, granted by a pool of most of the Spanish banks. The loan guaranteed by the State made it attractive for participating banks, but the liabilities of the FFPS became part of the central government debt.

We must note that this was an unconventional form of fiscal policy. As Figure 2 shows, all the agents involved substituted an asset for an asset or a liability for a liability. The FFPS did not incur additional liabilities for the general government. Rather, the central government borrowed directly from banks what was needed to pay local government debts. Local governments were thus released from their debts with suppliers while acquiring debt with the central government. Firms substituted one asset (invoices) with another asset (cash). The plan provided firms with a way to overcome their inability to borrow via factoring. While



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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 liquidity.

## 2.4 The natural experiment

We use the establishment of the FFPS as representing an unexpected accelerated repayment of local government arrears. To estimate the causal effect of the policy, we take advantage of an administrative mistake that left some municipalities out of the 2012 phase of the plan (which we label Phase I)

Spanish municipalities may channel some or all of their purchases through *mancomunidades*. These are legal pools of several municipalities engaged in procurement that seek to achieve some economies of scale and improve their bargaining power. Although from an economic standpoint, municipalities and *mancomunidades* are very similar, they have different legal statuses. The first pieces of legislation 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, which we label phase II. With approval to pay the arrears to the suppliers of *mancomunidades*, the ICO transferred over €1 bn to suppliers of regional and local governments.

The important fact for our analysis is that the reason why some firms participated in the new phase was due to an error in the plan's original legislation (it did not include *mancomunidades*), which was unrelated to the characteristics of the suppliers.

Figure IA.1 shows an example of water treatment procurement in the region of Andalucia. Some municipalities contract directly for water treatment, while others do so via *mancomunidades*. There are no major selection margins between the two groups. More importantly, the firms that supply *mancomunidades* and municipalities are very similar; indeed, often, firms supply both municipalities and *mancomunidades*. In our main analysis, we use firms that participate only in Phase I as the treated group (e.g., Firm A in the figure) and firms that participate only in Phase II as the control group (e.g., Firm B in the figure).[8]

[8]Note that we drop any firms that appeared both in Phase I and Phase II (e.g., Firm C in Figure IA.1).



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Both groups have exposure to the public sector, have public arrears, and are 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, a quasi-randomly selected group of firms with similar characteristics (Phase II firms).

# 3 Data

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

## 3.1 Data collection and sources

The main data for our analysis are provided by the Instituto de Crédito Oficial (ICO). They include anonymous firm information at an annual frequency from different phases of the FFPS. The data set includes information on each unpaid bill between a firm and each regional and local government, including amounts and payment dates.

The data are matched by the ICO to exhaustive firm-level financial data from the Iberian Balance Sheet Analysis System (SABI).[9]

For Phase I, matched firms account for 48.2% of all suppliers (64,879 of 134,568) and almost 70% of the funds injected (€19 bn of €27.3 bn). For Phase II, the ICO data set includes 1,848 firms, of which 1,201 are firms that had earlier received funds in Phase I, and 647 are firms that received funds only in Phase II.

ICO's data are also matched to Opentender. This database includes public procurement information on contractors, public buyer identifiers, and contract descriptions, including prices and amounts in more than 30 countries.

We obtain data on accounting information on municipalities and regions from a Spanish Finance Ministry database.

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



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Data on the business turnover index and factoring (unpaid bills of exchange) come from the Spanish Statistical Office.

Finally, we measure the media coverage of Phase I and Phase II using Factiva, which covers the universe of news in Spain. [10]

## 3.2 Summary statistics

Panel A of Table 1 presents summary statistics for firms in Phase I (column 1) and Phase II (column 2) in 2011, just before the repayment. The average liquidity shock (i.e., repayment) for firms in Phase I is €142,360, compared to €102,105 for firms in Phase II. To measure the liquidity shock for each firm, we aggregate all the unpaid invoices with different local and regional governments. This is the total amount of arrears that each firm has.

We also have information on seized amounts by the central government.[11] For each firm, we measure the liquidity shock as the total amount of arrears minus the total amount seized by the government. This results in the effective amount of euros transferred from ICO to the firm.

Firms in Phase I had average total assets of over €5 mm, and average total liabilities of over €3 mm. Firms in Phase II had average total assets of more than €6.7 mm, and average total liabilities of over €4.5 mm. As for cash, firms in Phase I and Phase II had about €280,000 and €270,000, respectively.[12]

On average, we do not observe any significant differences in the averages of variables across firms in Phase I and firms in Phase II. This suggests that the two groups of firms are comparable. Nevertheless, in Panel B of Table 1, we match firms in Phase II to firms in Phase I using entropy matching (Hainmueller, 2012) on the first moment of the liquidity shock, assets, and region. After matching, we can see that the averages of firm characteristics

[10] Factiva, provided by Dow Jones, gives access to more than 6 million articles every year in more than 200 Spanish national, regional, and local newspapers and magazines.

[11] Seized amounts represent debts that firms had with the central government. These seized amounts were deducted from the total amount of arrears paid to the firm.

[12] In Table IA.1 of the Appendix, we show aggregate descriptive statistics for the entire sample.



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become closer, and there are still no significant differences between the two groups.[13]

# 4 The effect of accelerated repayments on corporate decisions

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

## 4.1 Empirical strategy

To assess the causal impact of an accelerated repayment of government arrears, we require a treatment group that experiences an unexpected repayment of these arrears and a control group that, despite having a similar amount of unpaid arrears, does not get repaid at the same time. We attempt to mirror the ideal randomized experiment by leveraging the potentially random distribution of the repayment plan's implementation, as we have discussed. It was legislative oversight in 2012 that effectively created two groups of municipalities paid at different times.

Our underlying assumption is that the only difference between firms in Phase I and Phase II is that the former received repayment in mid-2012, while the latter received it a year later, in August 2013. Some of our specifications use entropy matching to improve the resemblance of both groups of firms.

We use the following specification:

$$y_{jt} = \beta_t PhaseI_{\{j \in Ph1\}} \times PostYear_{(t)} + \Lambda + \varepsilon_{jt} \tag{1}$$

where $y_{jt}$ is the first difference of the logarithm of fixed assets, total liabilities, and cash,

[13] We include matched summary statistics for firms in Phase I and Phase II in 2010 (Panel A) and 2009 (Panel B) in Table IA.2 of the Appendix. We do not find any significant differences with respect to the statistics of 2011.



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for firm $j$, in year $t$; $PhaseI_{\{j \in Ph1\}}$ is a dummy variable that takes a value of one for firms that participated in Phase I, and zero for firms that participated in Phase II; $PostYear_{(t)}$ are dummy variables indexed from 2009 to 2012 that take a value of zero for each year prior to the index, and one for each year after the index. We also add a set of fixed effects ($\Lambda$), which includes *year*, *industry*, and *region* effects. The coefficient of interest is $\beta_{2012}$, which indicates the effect of accelerated repayment on corporate decisions for firms in Phase I versus firms in Phase II. The coefficients $\beta_{2009}$ to $\beta_{2011}$ correspond to placebo treatments in which the treated year is the index year, and the control years are the years before. These placebo coefficients measure the differential pre-trends in the corporate investment of the groups. If the groups are comparable, we should observe insignificant coefficients before 2012. If there is an effect on the investment of payment a year later, we should observe a differential effect of the liquidity shock for the $Phase\ I$ x $PostYear_{2012}$ coefficient.

Next, we exploit the heterogeneity in the treatment, that is, in the amount of arrears that were repaid. We sort the firms in Phase I into four different groups according to the amount of liquidity over total assets that they receive: below 1%, between 1% up to 5%, between 5% up to 10%, and above 10%. We predict the strongest response from firms that experienced the largest liquidity shock, that is, those that accumulated more arrears before the repayment program. We also expect that firms that had less accumulated public arrears will have less of a reaction. This "no-effect" result would also serve as a placebo test that confirms that the different reactions from firms in Phase I and Phase II are indeed due to the accelerated repayment.

We match each of the four groups of treated firms in Phase I, with all the firms in Phase II, according to total assets and liquidity shock. This matching approach allows a direct comparison of firms that received a liquidity shock in Phase I and firms of a similar size that experienced a similar liquidity shock a year later in Phase II. As in the previous specification, all the results include *year*, *industry*, and *region* fixed effects, with standard errors clustered at the firm level.



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## 4.2 Investment, leverage, and liquidity decisions

We first analyze the impact of the central government's repayment of arrears on various corporate decisions. We exploit the plan's random repayment schedule, using the structure outlined in Equation 1.

Table 2 reports the main effects of the liquidity shock on investment, leverage growth, and liquidity growth. Year-fixed effects are included in columns 1, 3, and 5, and columns 2, 4, and 6 include year, industry, and region fixed effects. We cluster standard errors at the firm level.

Including *year* fixed effects as the first step in the regression analysis is important because it helps to control for time-specific shocks and trends that may affect all firms equally within a particular year. This is especially relevant in our setting, as the period of analysis coincides with the European sovereign debt crisis. Subsequently, incorporating *industry* and *region* fixed effects is important to control for any unobserved time-invariant heterogeneity across different industries and regions that may systematically affect firms' corporate decisions. Clustering the standard errors by firm is also necessary to account for potential within-firm correlation or heteroscedasticity.

The baseline results shown in Panel A suggest that firms in Phase I and Phase II exhibit a similar pattern in terms of investment, leverage, and liquidity decisions for the period of 2009-2011. We do observe weakly significant results for investment and liquidity growth in 2012. To further reduce any potential differences between the treatment and control groups before 2012, we implement an entropy-balancing matching approach. This method reweights the two groups according to the size of the liquidity shock and total assets in 2011. Panel B of Table 2 shows that the results remain pretty similar after applying entropy matching, corroborating the findings in Table 1 that both groups are closely comparable.

These tests aggregate all firms with arrears and provide an "overall effect" of repayment. This approach, though, gives equal weight to firms that receive minor liquidity injections and those that receive larger ones. The vast diversity in the size of the repayment shock across firms might contribute to the mildly significant outcomes, as the level of arrears varies



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significantly from company to company. Thus, we expect that for firms with smaller arrears, the timing of repayment in 2012 or 2013 should not significantly affect their business decisions.

To account for the heterogeneity in the size of the liquidity shock, we group firms according to the amount of arrears repaid. We sort the firms in Phase I into four different groups according to the amount of cash over the total assets they receive: below 1%, between 1% up to 5%, between 5% up to 10%, and above 10%.

First, we assess firms' responses in terms of investment decisions. Whether firms with greater arrears will react to early repayment by increasing investments is not clear. Firms that have accumulated large amounts of unpaid bills might resort to short-term debt either by obtaining trade credit from suppliers or borrowing against their accounts receivables. In the presence of financial frictions, financially constrained firms might be forced to delay investment until they recoup their receivables.

The results presented in Table 3 are consistent with the hypothesis that firms exposed to late payment might have forgone investment opportunities and reacted by increasing investments upon receiving the liquidity shock. We find a clear, monotonic relation between the size of the liquidity shock and the firm investment response. Firms experiencing the most substantial shocks (those above 10% of their total assets) show a significant 14% increase in investments compared to their Phase II counterparts. Table IA.1 in the Appendix indicates this increase in investment is economically important, as it represents about 30% ($0.14/0.47 = 0.30$) of the standard deviation of the investment growth of the firms in our sample.

This trend matches our theoretical expectations that the accelerated repayment of arrears can indeed spur investment activity, particularly for firms experiencing great liquidity shocks. While firms aiming to make investments should be able to borrow from banks using public arrears as collateral, financial constraints could hinder the process. Imperfect financial markets could deter banks from lending even with fairly safe collateral. More on this later.

Next, we study the impact of a liquidity shock on corporate leverage decisions. Table 4



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shows that firms reduce their liabilities upon receiving a liquidity shock equivalent to at least 10% of their total assets. Treated firms reduce their leverage growth by about 10% compared to firms in Phase II. In economic terms, this reduction represents about 22% (0.10/0.44 = 0.22) of the standard deviation of changes in leverage during our sample period. These results suggest that when firms receive an unexpected injection of liquidity, they use these funds to pay off their outstanding liabilities, which would not only reduce their debt burden but also improve their financial health. The repayment is especially pronounced for firms that have substantial arrears, as they would receive a greater liquidity shock, enabling them to pay down a more significant portion of their liabilities.

Lastly, we study the impact on cash accumulation and present the results in Table 5. We find a positive, monotonic relation between the size of the liquidity injection and the increase in cash holdings. Firms experiencing the most substantial shocks (again, those above 10% of their total assets) keep about 44.4% more cash than Phase II firms. This increase is economically meaningful. Given the distribution of changes in liquidity by firms in our sample, the increase in liquidity represents about 41% (0.44/1.08 = 0.41) of the standard deviation. As expected, the cash accumulation is particularly evident in firms receiving a greater liquidity shock, as they would have more funds to retain.

This result validates our experimental framework and suggests that firms use the liquidity shock not just for investment and to reduce liabilities, but also for cash accumulation. A potential explanation for this increase in cash holdings might be that firms that suffer from late payments decide to keep cash as a buffer against financial distress and gain more flexibility in their future operational and strategic decisions.

The key point to learn from these findings is that the extent of the repayment significantly influences a firm's response. The effect of the liquidity shock becomes more pronounced with the amount of the repayment, particularly when it reaches 10% of the firm's total assets. Thus, the results demonstrate the importance of sorting the sample into different levels of repayment magnitudes when we evaluate the effect of accelerated payment of arrears on firm decisions. We follow this approach for all the remaining tests.



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## 4.3 Robustness: DiD and Synthetic DiD

Next, we follow an alternative empirical approach and estimate the impact of accelerated repayment on corporate decisions in a Differences-in-Differences (DiD) setting. Rather than compare firms in Phase I against firms in Phase II for different years, we compare the corporate decisions of firms in Phase I and Phase II in the period before (2009-2011) and the period after (2012) the liquidity shock. By comparing changes over time in the treatment group to changes in the control group, the DiD design helps to isolate the causal effect of the treatment (repayment shock) on the firm's corporate decisions. Furthermore, the DiD approach allows us to mitigate biases in the estimated treatment effect stemming from common firm trends.

In Table 6, we estimate a specification similar to that in Equation 1, but we add a firm fixed effect and collapse all year dummies ($PostYear_t$) into a unique time indicator variable that takes a value of one in 2012, and a value of zero for the period 2009-2011 (*Post 2012*). Effectively, we are comparing the period 2009-2011 to 2012. Because we also include *year* and *firm* fixed effects, our variable of interest is the interaction term *Phase I x Post 2012*.

Panel A details the effect on firm investment decisions. Results are very similar to those described in Table 3. In particular, as the extent of the liquidity shock increases (from below 1% to above 10% of total assets), we observe a monotonic increase in the effect on investment. The impact is most significant for firms that receive a liquidity shock of greater than 10% of their total assets, increasing investment by approximately 7%. The t-statistic of 2.47 indicates this result is statistically significant at the 5% level.

Panel B evaluates the effect of liquidity shocks on leverage decisions. Here, we see that only firms receiving a large liquidity shock (greater than 10% of their total assets) show a significant reduction of 16% in their leverage. This effect is highly statistically significant, with a t-statistic of -5.11, indicating that the effect is robust at the 1% level. Panel C investigates the relation between the amount of the repayment shock and liquidity decisions. Here, we see a significant effect for firms receiving liquidity shocks amounting to more than 5% of their total assets. Again, the effect is strongest for firms with a liquidity shock exceeding 10% of their assets. In economic terms, these firms increase their cash holdings by more than 45%.



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Taken together, these results provide strong evidence that greater liquidity shocks lead to more significant changes in corporate decisions. Firms experiencing the most substantial shocks are more likely to boost investments, reduce their liabilities, and retain larger cash holdings.

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

Thus, in this part of the analysis, the treatment group is the firms in Phase II, and the control group is the firms in Phase I. The weights are chosen to optimally match the pre-adoption outcomes of the firms in Phase II, so they capture any possible trends. The difference between the observed outcomes post-adoption and the predicted outcomes is the estimated treatment effects using the method in Abadie (2021). The results, as shown in Table 7, are similar to those in Table 6. We find that firms in Phase II significantly reduce investment (5.0%), increase leverage (9.4%), and deplete cash (28.4%) compared to firms in Phase I.

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



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# 5 The role of financing frictions

In a frictionless financial market, firms should be able to borrow using their government arrears as collateral. If this were the case, we should not observe an increase in investment for financially constrained firms after the government cash injection. As Figure 4 shows, factoring became less of an option during this period due to the severe Spanish credit crunch. In 2007, factoring was above 30% of the Spanish GDP, but after the financial crisis burst, it dropped steadily to almost a third of its previous volume. Such a decline was much more severe than, for example, the reduction in the Spanish business turnover index.

We analyze whether the effect of the liquidity shock on several corporate outcomes depends on how financially constrained firms may be. As a measure of financing constraints, we analyze the banking relations of the firms. We classify firms into "Top Banks" if they work with at least one top bank. We define top banks as those with a core equity tier 1 (CET1) capital ratio above 7.4% of risk-weighted assets, which was the average CET1 capital ratio for the overall Spanish banking sector in the adverse scenario of the stress tests run by the European Banking Authority (EBA) in 2011.[14]

Bank stress test results are an indicator of a bank's vulnerability and its capacity to lend. Banking relations were particularly important during our period of analysis, as Spain experienced a severe credit crunch after the burst of the financial crisis (Bentolila et al. (2013), Jimenez et al. (2014)). Figure IA.3 in the Appendix shows the average amount of factoring of Spanish SPP arrears by top banks vs. non-top banks. One can see that top banks were able to provide more factoring than non-top banks, particularly after the onset of the financial crisis in 2008.

We use the specification in Equation 1 and split firms into "Top Banks" or "Excluding Top Banks," depending on whether, in 2009, they worked with at least one top bank.[15] We also split firms according to the size of the liquidity injection received. We look particularly

[14] See the presentation of the 2011 EBA stress tests results for Spanish banks in ff

[15] We look at the banking relationships of firms in 2009 as it is the first year of our sample right before Spain entered into a significant restructuring of its banking sector. While firms could eventually move their businesses to other banks, there is plenty of evidence showing that bank-firm relationships are sticky (Petersen and Rajan, 1994; Santos and Winton, 2008; Darmouni, 2020).



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at firms that received a liquidity shock below 1% of their total assets and firms that received a liquidity shock above 10% of their total assets. Firms in the lower liquidity group act as an additional control group for our analyses. Firms in the higher liquidity group received a greater shock and are the most "treated" firms, so consistent with our results of Section 4.2, they are expected to react more to the shock. The information on these two groups allows us to extract conclusions on whether the reaction of firms to late payment depends on the extent of the accumulated arrears.

Panel A of Table 8 shows that only firms that did not use top banks significantly increase investment after the liquidity injection of 2012. This suggests that firms operating with top banks are not financially constrained and do not curtail investment, despite their accumulation of arrears. In particular, firms that did not use a top bank and receive a large liquidity shock devote 11% of the cash transfers to increase investment.

In Panel B of Table 8, one can see that firms that use at least a top bank significantly reduce liabilities once they receive the liquidity shock in 2012. This shows that firms using top banks that receive a large liquidity shock repay debt to reduce their leverage growth by 19%. Firms that do not use top banks devote less to repay debt (11% reduction).

Note in Panel C of Table 8 that both groups of firms significantly retain cash after receiving the liquidity injection. Firms with top banks increase cash holdings growth by 47%, and firms without top banks increase cash holdings growth by 43%. Firms without top banks might be willing to retain cash even if they are more financially constrained because greater cash balances make them safer. Harford et al. (2014) show that firms mitigate greater refinancing risk by increasing cash holdings and conserving cash. It is clear that firms significantly retain cash, regardless of whether they worked with top banks or not. This may be due to the time period. In 2012, Spain was still in the middle of a crisis, and investment opportunities were likely limited. Bates et al. (2009) find evidence of precautionary motives driving firms to increase their cash ratios in riskier times. This speaks to the interpretation of all our previous results. For example, our results in Panel A of Table 8 may be interpreted as a lower bound of the effect that a similar program could have in the context of expanded investment



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opportunities.

In Table 9, we further analyze the impact of late payment on firms' liabilities. Panel A shows that firms with top banks that had many arrears significantly reduce financial debt. This suggests that these firms were able to increase debt levels temporarily to offset the financing needs that originated from the accumulation of arrears. In column 4 of Panel A, however, we show that firms that did not use top banks could not increase their debt levels. Column 4 of Panel B shows that these (financially constrained) firms did significantly increase their accounts payable. These results suggest that financially constrained firms had to delay payments to suppliers because financial debt was unavailable to them. Thus, we see that late payments by local governments may spread through the supply chain, particularly for financially constrained firms.[16]

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

[16] Alfaro et al. (2021) explore the Spanish setting and show that bank credit shocks can propagate downstream in the supply chain and affect suppliers.



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# 6 Public procurement contracts

A significant issue is how delayed payments by public administrations can influence procurement contracting. We focus specifically on firms that enter into contracts with public administrations with an aim to discern whether there is a distinct pattern in public contracting behavior between firms that have unpaid bills and those that do not. Public procurement contracts are of critical importance to both firms and public entities. For firms, these contracts can offer a stable and often substantial revenue stream (Goldman, 2020). For public entities, procuring goods and services from private firms allows them to fulfill their public service mandate efficiently. Thus, the impact of late payments in this context is particularly pertinent.

We use data from Opentender to examine how delayed payments affected firms' public procurement decisions during the period 2009-2012. Opentender is an online public procurement database that collects information on government procurement activities. We aggregate the contract-level data into a firm-buyer-year level, where the buyer is a local government.

The results are in Table 10. In columns 1 and 2, the dependent variable takes a value of one if there is a new contract between a firm and a local government. Columns 3 and 4 explore a more continuous specification where the dependent variable is one plus the natural logarithm of the price of all the awarded contracts between the firm and the local government in a given year. The main explanatory variable is *Arrears*, a dummy that takes a value of one for firm-local government pairs where the local government has accumulated arrears owed to that firm, and zero otherwise. The control group is all firms listed in Opentender without arrears with public administrations as of the end of 2011 (they are not in the FFPS).

We conjecture that the level of arrears will affect the contracting behavior of firms. Firms with few arrears are deemed not to respond to the late payment. Thus, we split the sample into firms in the lowest quartile of the liquidity shock and firms above it (below and above 1.5% of their total assets). We match these two samples of treated firms with arrears to all the firms in Opentender without arrears according to the buyer's municipality (the local government that



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is contracting with the firm) and the probability that the firm has a procurement contract in 2009. Effectively, we are comparing firms contracting with the same municipality and with the same probability of having a public procurement contract. This is relevant since Ferraz et al. (2015) show that procurement-awarded firms are more likely to win more future public auctions. To control for time-varying unobservable characteristics at the firm level, we include year x firm fixed effects in all the specifications.

Results in column 1 show that the public procurement decisions of firms with fewer arrears by 2011 are not different from the decisions of firms that do not have arrears in 2011. Results in column 2 show that firms with large arrears in 2011 are less likely to contract with the government in 2011 than firms that do not have arrears in 2011. In economic terms, firms with arrears are about 18.6% less likely to sign a new contract with a public entity. This may imply that if the amount of delayed payments is large enough, firms choose not to contract with a government any longer. These results are corroborated when we analyze the size of contracts with public administrations. In column 4, firms with greater arrears in 2011 also contract significantly less with the government in 2011, while firms with fewer arrears in 2011 do not seem to be affected.

These findings shed light on the relationship dynamics between firms and public procurement, particularly regarding the impact of late payments on business ties between customers and suppliers. Our results indicate that if public administrations delay their payments, their customers might be hesitant to pursue public procurement contracts with them again in the future.

# 7 Conclusion

We study the effect of the accelerated repayment of government arrears using the Spanish central government's large repayment plan in 2012 on firms with unpaid arrears from procurement contracts with local governments. This plan (the Plan de Pago a Proveedores – Supplier Payment Plan or SPP) was developed to aid firms suffering a severe credit crunch



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in a recessionary environment. Using a unique data set and a clean causal identification strategy, we find corporate investment responds positively and significantly to an unexpected government liquidity injection. This indicates that unorthodox stimulus policies can recharge economic growth, especially for firms that work with banks that may not provide sufficient credit.

Indeed, we show that the impact of this policy is different across firms. Firms using top banks do not increase investment but instead, use the liquidity received to repay financial debt and accumulate cash. Firms working without top banks significantly increase investment and repay suppliers after the liquidity injection.

From a policy perspective, our results provide important insight into how unorthodox fiscal policies that do not change overall public liabilities can be effective. They also show how the early repayment of arrears has heterogeneous effects across firms. While financially constrained firms increase investment, financially unconstrained firms repay debt and retain cash.

Further, our paper sheds light on firms' strategies to counter late payments during economic downturns. While less financially constrained firms can borrow to mitigate the effects of government arrears, financially constrained firms might have to forgo investment opportunities. Implicitly, our research also sheds light on firms' inability to collateralize public arrears, thereby contributing to the sparse literature on financial factoring.

Our findings also underscore the impact of the delayed payment of accumulated arrears by public administrations on procurement contracting. We see that firms burdened with substantial arrears tend to shrink from contracting with the public sector, a phenomenon predominantly observed among financially constrained firms. When arrears are minimal, firms might actually increase their contracting. These relationships and their impact on public procurement contracts deserve further attention, given their significant implications for both firms and public entities. Future research should investigate how these findings might generalize to different contexts and periods beyond our setting.



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**Table 1: Summary Statistics: 2011**

This table reports the mean of 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 include the sample of Spanish firms that worked for local government entities that received the liquidity shock in year 2012, and Phase II includes firms that received the liquidity shock in 2013. Panel A compares firms in Phase I and Phase II before matching. In Panel B, firms from Phase I and Phase II are matched based on total assets, liquidity shock, and region. Firm characteristics are measured in year 2011.

Panel A: Unmatched

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Variable | Phase I | Phase II | Difference | P-value |
| Liquidity Shock | 142.360 | 102.105 | -40.255 | (0.460) |
| Total assets | 5,139.655 | 6,743.966 | 1,604.311 | (0.161) |
| Total liabilities | 3,244.934 | 4,549.020 | 1,304.086 | (0.123) |
| Cash | 280.514 | 269.317 | -11.197 | (0.806) |
| Employment to assets | 0.016 | 0.019 | 0.002 | (0.359) |
| Leverage ratio | 0.373 | 0.396 | 0.022 | (0.197) |
| Total debt | 1,554.632 | 2,323.752 | 769.120 | (0.127) |
| Sales to assets | 1.294 | 1.315 | 0.021 | (0.749) |
| Sales growth | -0.006 | 0.036 | 0.042 | (0.190) |
| ROE | 7.345 | 13.836 | 6.491 | (0.283) |
| Long-term debt | 814.032 | 1,168.053 | 354.021 | (0.178) |
| Short-term debt | 578.430 | 792.305 | 213.875 | (0.195) |
| Investment | 0.009 | 0.056 | 0.047 | (0.136) |
| Leverage growth | -0.017 | 0.003 | 0.020 | (0.408) |
| Liquidity growth | -0.151 | -0.102 | 0.049 | (0.364) |
| Observations | 41,665 | 487 | 42,152 | |

Panel B: Matched

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Variable | Phase I | Phase II | Difference | P-value |
| Liquidity Shock | 142.360 | 142.351 | -0.009 | (1.000) |
| Total assets | 5,139.655 | 5,139.658 | 0.003 | (1.000) |
| Total liabilities | 3,244.934 | 3,336.247 | 91.313 | (0.886) |
| Cash | 280.514 | 311.054 | 30.540 | (0.749) |
| Employment to assets | 0.016 | 0.017 | 0.001 | (0.704) |
| Leverage ratio | 0.373 | 0.381 | 0.008 | (0.718) |
| Total debt | 1,554.632 | 1,736.338 | 181.706 | (0.656) |
| Sales to assets | 1.294 | 1.329 | 0.035 | (0.679) |
| Sales growth | -0.006 | 0.011 | 0.018 | (0.610) |
| ROE | 7.345 | 6.321 | -1.025 | (0.929) |
| Long-term debt | 814.032 | 873.492 | 59.460 | (0.786) |
| Short-term debt | 578.430 | 629.969 | 51.539 | (0.714) |
| Investment | 0.009 | 0.048 | 0.039 | (0.230) |
| Leverage growth | -0.017 | -0.001 | 0.016 | (0.720) |
| Liquidity growth | -0.151 | -0.105 | 0.046 | (0.523) |
| Observations | 41,665 | 487 | 42,152 | |



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**Table 2:** Effects on Corporate Decisions

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

Panel A: Unmatched Regressions

| | Investment | | Leverage growth | | Liquidity growth | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Phase I × Post 2009 | 0.005 | 0.009 | -0.012 | -0.006 | 0.054 | 0.054 |
| | (0.28) | (0.48) | (-0.45) | (-0.22) | (1.01) | (1.01) |
| Phase I × Post 2010 | -0.006 | -0.006 | -0.007 | -0.007 | -0.072 | -0.073 |
| | (-0.22) | (-0.23) | (-0.19) | (-0.19) | (-0.87) | (-0.88) |
| Phase I × Post 2011 | -0.046 | -0.046 | -0.001 | -0.001 | -0.030 | -0.031 |
| | (-1.18) | (-1.18) | (-0.02) | (-0.02) | (-0.37) | (-0.38) |
| Phase I × Post 2012 | 0.079** | 0.079** | 0.002 | 0.003 | 0.136* | 0.137* |
| | (2.13) | (2.14) | (0.07) | (0.09) | (1.67) | (1.69) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | No | Yes | No | Yes | No | Yes |
| Industry FE | No | Yes | No | Yes | No | Yes |
| Observations | 155881 | 155881 | 157309 | 157309 | 142338 | 142338 |
| Adjusted $R^2$ | 0.001 | 0.003 | 0.007 | 0.010 | 0.005 | 0.006 |

Panel A: Matched Regressions

| | Investment | | Leverage growth | | Liquidity growth | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Phase I × Post 2009 | 0.006 | 0.007 | -0.006 | -0.001 | 0.042 | 0.037 |
| | (0.29) | (0.37) | (-0.20) | (-0.03) | (0.75) | (0.67) |
| Phase I × Post 2010 | -0.013 | -0.013 | -0.026 | -0.026 | -0.067 | -0.070 |
| | (-0.45) | (-0.46) | (-0.65) | (-0.66) | (-0.78) | (-0.81) |
| Phase I × Post 2011 | -0.042 | -0.042 | 0.010 | 0.010 | -0.009 | -0.012 |
| | (-1.05) | (-1.05) | (0.25) | (0.27) | (-0.10) | (-0.14) |
| Phase I × Post 2012 | 0.080** | 0.080** | 0.005 | 0.006 | 0.126 | 0.128 |
| | (2.15) | (2.16) | (0.14) | (0.15) | (1.54) | (1.57) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Region FE | No | Yes | No | Yes | No | Yes |
| Industry FE | No | Yes | No | Yes | No | Yes |
| Observations | 150320 | 150320 | 151653 | 151653 | 137486 | 137486 |
| Adjusted $R^2$ | 0.003 | 0.005 | 0.007 | 0.013 | 0.005 | 0.010 |



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**Table 3:** Effects on Investment Decisions

This table presents estimates from panel matching regressions explaining investment decisions for the period 2009 to 2012. Firms from Phase I and Phase II are matched based on total assets and the size of the liquidity shock. The dependent variable is the first difference in the logarithm of fixed assets. *Phase I* is a dummy that takes a value of 1 for firms that received liquidity in Phase I (2012) and zero for firms that received liquidity a year later in Phase II. *Post 2009*, *Post 2010*, *Post 2011*, and *Post 2012* are indicator variables for years 2009-2012, 2010-2012, 2011-2012, and 2012, respectively. We sort our sample into firms that received a liquidity shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include year, region, and industry fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

| | Investment | | | |
|---|---|---|---|---|
| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
| Phase I × Post 2009 | 0.009 | 0.002 | 0.006 | 0.028 |
| | (0.47) | (0.11) | (0.28) | (0.95) |
| Phase I × Post 2010 | -0.007 | -0.005 | -0.016 | -0.082 |
| | (-0.23) | (-0.16) | (-0.45) | (-1.61) |
| Phase I × Post 2011 | -0.046 | -0.043 | -0.037 | -0.022 |
| | (-1.15) | (-1.07) | (-0.89) | (-0.52) |
| Phase I × Post 2012 | 0.066* | 0.079** | 0.094** | 0.139*** |
| | (1.78) | (2.09) | (2.40) | (3.55) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 79553 | 41696 | 15232 | 18717 |
| Adjusted $R^2$ | 0.006 | 0.005 | 0.004 | 0.005 |



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**Table 4:** Effects on Leverage Decisions

This table presents estimates from panel matching regressions explaining leverage decisions for the period 2009 to 2012. Firms from Phase I and Phase II are matched based on total assets and the size of the liquidity shock. The dependent variable is the first difference in the logarithm of total liabilities. *Phase I* is a dummy that takes a value of 1 for firms that received liquidity in Phase I (2012) and zero for firms that received liquidity a year later in Phase II. *Post 2009*, *Post 2010*, *Post 2011*, and *Post 2012* are indicator variables for years 2009-2012, 2010-2012, 2011-2012, and 2012, respectively. We sort our sample into firms that received a liquidity shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include year, region, and industry fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

| | Leverage Growth | | | |
|---|---|---|---|---|
| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
| Phase I × Post 2009 | -0.020 | 0.000 | 0.020 | 0.080 |
| | (-0.71) | (0.01) | (0.61) | (1.61) |
| Phase I × Post 2010 | -0.002 | -0.036 | -0.051 | -0.128* |
| | (-0.06) | (-0.89) | (-1.11) | (-1.92) |
| Phase I × Post 2011 | 0.014 | 0.013 | 0.000 | 0.023 |
| | (0.37) | (0.33) | (0.01) | (0.54) |
| Phase I × Post 2012 | 0.014 | 0.028 | 0.014 | -0.104** |
| | (0.39) | (0.75) | (0.35) | (-2.24) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 80015 | 42097 | 15398 | 19099 |
| Adjusted $R^2$ | 0.013 | 0.012 | 0.012 | 0.024 |



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**Table 5:** Effects on Liquidity Decisions

This table presents estimates from panel matching regressions explaining liquidity decisions for the period 2009 to 2012. Firms from Phase I and Phase II are matched based on total assets and the size of the liquidity shock. The dependent variable is the first difference in the logarithm of cash. *Phase I* is a dummy that takes a value of 1 for firms that received liquidity in Phase I (2012) and zero for firms that received liquidity a year later in Phase II. *Post 2009*, *Post 2010*, *Post 2011*, and *Post 2012* are indicator variables for years 2009-2012, 2010-2012, 2011-2012, and 2012, respectively. We sort our sample into firms that received a liquidity shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include year, region, and industry fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

| | Liquidity growth | | | |
|---|---|---|---|---|
| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
| Phase I × Post 2009 | 0.036 | 0.040 | 0.035 | 0.017 |
| | (0.64) | (0.70) | (0.52) | (0.16) |
| Phase I × Post 2010 | -0.063 | -0.060 | -0.093 | -0.083 |
| | (-0.73) | (-0.68) | (-0.93) | (-0.56) |
| Phase I × Post 2011 | -0.006 | -0.030 | -0.009 | 0.038 |
| | (-0.07) | (-0.36) | (-0.10) | (0.42) |
| Phase I × Post 2012 | 0.049 | 0.096 | 0.197** | 0.444*** |
| | (0.59) | (1.16) | (2.24) | (4.41) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 72616 | 38091 | 13994 | 17309 |
| Adjusted $R^2$ | 0.008 | 0.010 | 0.011 | 0.025 |



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**Table 6:** Effects on Corporate Decisions: DiD

This table presents estimates from a Diff-in-Diff panel matching regressions explaining corporate decisions for the period 2009 to 2012. Firms from Phase I and Phase II are matched based on total assets and liquidity shock. 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). *Phase I* is a dummy that takes a value of 1 for firms that received liquidity in Phase I (2012) and zero for firms that received liquidity a year later in Phase II. *Post 2012* is an indicator that equals 1 for year 2012. We sort our sample into firms that received a liquidity shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include year, region, and industry fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
|---|---|---|---|---|
| Phase I × Post 2012 | 0.027 | 0.039 | 0.051* | 0.069** |
| | (1.11) | (1.52) | (1.87) | (2.47) |
| Year FE | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Observations | 78135 | 40633 | 14764 | 17980 |
| Adjusted $R^2$ | 0.078 | 0.072 | 0.052 | 0.057 |

Panel B: Leverage Growth

| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
|---|---|---|---|---|
| Phase I × Post 2012 | 0.022 | 0.019 | -0.017 | -0.159*** |
| | (0.77) | (0.65) | (-0.55) | (-5.11) |
| Year FE | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Observations | 78624 | 41051 | 14937 | 18346 |
| Adjusted $R^2$ | 0.042 | 0.033 | 0.011 | 0.024 |

Panel C: Liquidity Growth

| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
|---|---|---|---|---|
| Phase I × Post 2012 | 0.042 | 0.069 | 0.164*** | 0.455*** |
| | (0.69) | (1.15) | (2.60) | (7.32) |
| Year FE | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Observations | 70646 | 36788 | 13426 | 16435 |
| Adjusted $R^2$ | -0.157 | -0.156 | -0.171 | -0.165 |



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**Table 7:** Effects on Corporate Decisions: SDiD

This table presents estimates from Synthetic Diff-in-Diff (Arkhangelsky et al. (2021)) regressions explaining corporate decisions 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). *Phase II* is a dummy that takes a value of 1 for firms that received liquidity in Phase II (2013) and zero for firms that received liquidity a year earlier in Phase I. *Post 2012* is an indicator that equals 1 for year 2012. We sort our sample into firms that received a liquidity shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. Robust T-statistics are shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
|---|---|---|---|---|
| Phase II × Post 2012 | 0.001 | -0.010 | -0.017 | -0.050*** |
| | (0.46) | (-0.73) | (-1.60) | (-3.79) |

Panel B: Leverage Growth

| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
|---|---|---|---|---|
| Phase II × Post 2012 | -0.003 | -0.003 | 0.026 | 0.094*** |
| | (-0.14) | (-0.10) | ( 0.82) | (8.09) |

Panel C: Liquidity Growth

| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
|---|---|---|---|---|
| Phase II × Post 2012 | -0.002 | -0.021 | -0.103* | -0.284*** |
| | (-0.11) | (-0.84) | (-1.81) | (-5.78 ) |



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**Table 8:** Effects on Corporate Decisions: Bank Heterogeneity

This table presents estimates from panel matching regressions explaining corporate decisions 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). Firms from Phase I and Phase II within the same bank type are matched based on total assets and the liquidity shock. *Phase I* is a dummy that takes a value of 1 for firms that received liquidity in Phase I (2012) and zero for firms that received liquidity a year later in Phase II. *Post 2012* is an indicator that equals 1 for year 2012. We sort our sample into firms that received a liquidity shock below 1% and above 10% of their total assets. The sample "Top Banks" includes all firms that in 2009 worked with at least one bank with a core equity tier 1 (CET 1) capital ratio above 7.4. The sample "Excluding Top Banks" includes all other firms. In Panel A, the dependent variable is the first difference in the logarithm of fixed assets. In Panel B, the dependent variable is the first difference in the logarithm of total liabilities. In Panel C, the dependent variable is the first difference in the logarithm of cash. All regressions include year, region, and industry fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

Panel A: Investment

| | Top Banks | | Excluding Top Banks | |
|---|---|---|---|---|
| | $< 1\%$ | $> 10\%$ | $< 1\%$ | $> 10\%$ |
| Phase I × Post 2012 | 0.023 | 0.059 | 0.036 | 0.112*** |
| | (0.67) | (1.43) | (1.15) | (3.27) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 28725 | 4353 | 50828 | 14364 |
| Adjusted $R^2$ | 0.015 | 0.013 | 0.007 | 0.006 |

Panel B: Leverage Growth

| | Top Banks | | Excluding Top Banks | |
|---|---|---|---|---|
| | $< 1\%$ | $> 10\%$ | $< 1\%$ | $> 10\%$ |
| Phase I × Post 2012 | 0.007 | -0.192*** | 0.023 | -0.112*** |
| | (0.20) | (-4.53) | (0.64) | (-3.02) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 28787 | 4372 | 51228 | 14727 |
| Adjusted $R^2$ | 0.019 | 0.037 | 0.014 | 0.022 |

Panel C: Liquidity Growth

| | Top Banks | | Excluding Top Banks | |
|---|---|---|---|---|
| | $< 1\%$ | $> 10\%$ | $< 1\%$ | $> 10\%$ |
| Phase I × Post 2012 | 0.007 | 0.468*** | 0.032 | 0.433*** |
| | (0.06) | (3.55) | (0.49) | (6.61) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 26782 | 4094 | 45834 | 13215 |
| Adjusted $R^2$ | 0.013 | 0.029 | 0.009 | 0.025 |



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**Table 9:** Financial Debt and Accounts Payable

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

Panel A: Financial Debt Growth

| | Top Banks | | Excluding Top Banks | |
|---|---|---|---|---|
| | $< 1\%$ | $> 10\%$ | $< 1\%$ | $> 10\%$ |
| Phase I × Post 2012 | -0.050 | -0.328*** | 0.072 | -0.074 |
| | (-0.92) | (-5.20) | (1.34) | (-1.37) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 13047 | 1467 | 16838 | 3318 |
| Adjusted $R^2$ | 0.022 | 0.045 | 0.026 | 0.053 |

Panel B: Accounts Payable Growth

| | Top Banks | | Excluding Top Banks | |
|---|---|---|---|---|
| | $< 1\%$ | $> 10\%$ | $< 1\%$ | $> 10\%$ |
| Phase I × Post 2012 | 0.050 | -0.096 | -0.005 | -0.140*** |
| | (0.98) | (-1.57) | (-0.11) | (-2.89) |
| Year FE | Yes | Yes | Yes | Yes |
| Region FE | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes |
| Observations | 28434 | 4261 | 49298 | 13531 |
| Adjusted $R^2$ | 0.018 | 0.015 | 0.005 | 0.010 |



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**Table 10:** Effects on Public Procurement

This table presents estimates from panel matching regressions explaining firms' public procurement decisions for the period 2009 to 2012. In this analysis, the unit of observation is at the firm-buyer-year level, where a buyer is a local government. In columns 1 and 2, the dependent variable is a dummy taking value one if there is a new contract between a firm and a local government and taking value zero otherwise. In columns 3 and 4, the dependent variable is one plus the natural logarithm of the price of all the awarded contracts between the firm and the local government in that year. *Arrears* is a dummy that takes a value of 1 for firm-local government pairs where the local government has accumulated arrears owed to that firm, and zero otherwise. *Post 2009*, *Post 2010*, *Post 2011*, and *Post 2012* are indicator variables for years 2009-2012, 2010-2012, 2011-2012, and 2012, respectively. We use entropy matching on local government and the existence of a public contract in 2009. We sort our sample into firms that received a liquidity shock below 1.5% (bottom quartile) and above 1.5% of their total assets. All regressions include year x firm fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5% or 10% level, respectively.

| | New Contract | | New Contract Price | |
|---|---|---|---|---|
| | $< 1.5\%$ | $> 1.5\%$ | $< 1.5\%$ | $> 1.5\%$ |
| Arrears × Post 2009 | 0.125 | 0.088 | 1.486 | 1.258 |
| | (0.94) | (1.56) | (0.94) | (1.55) |
| Arrears × Post 2010 | -0.000 | 0.117 | 0.019 | 1.644 |
| | (-0.49) | (1.34) | (0.97) | (1.31) |
| Arrears × Post 2011 | -0.125 | -0.186** | -1.507 | -2.615** |
| | (-0.94) | (-2.07) | (-0.94) | (-2.08) |
| Arrears × Post 2012 | 0.000 | -0.100 | -0.000 | -1.103 |
| | (0.02) | (-0.91) | (-0.04) | (-0.73) |
| Year x Firm FE | Yes | Yes | Yes | Yes |
| Observations | 16692 | 17408 | 16692 | 17408 |
| Adjusted $R^2$ | 0.785 | 0.444 | 0.819 | 0.424 |



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**Figure 1:** Appearance of SPP news in Spanish Newspapers

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

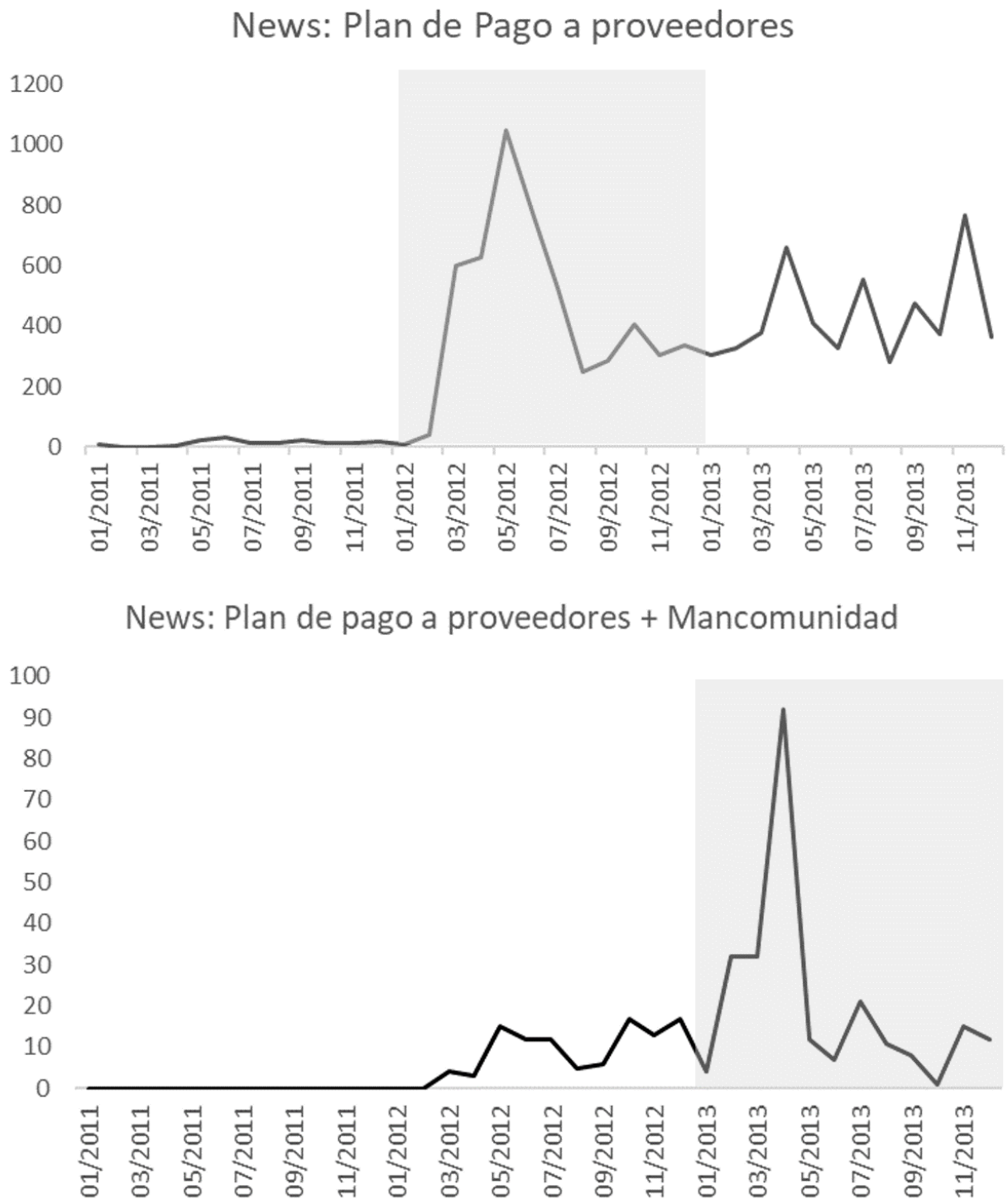




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**Figure 2:** Analytical Framework

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

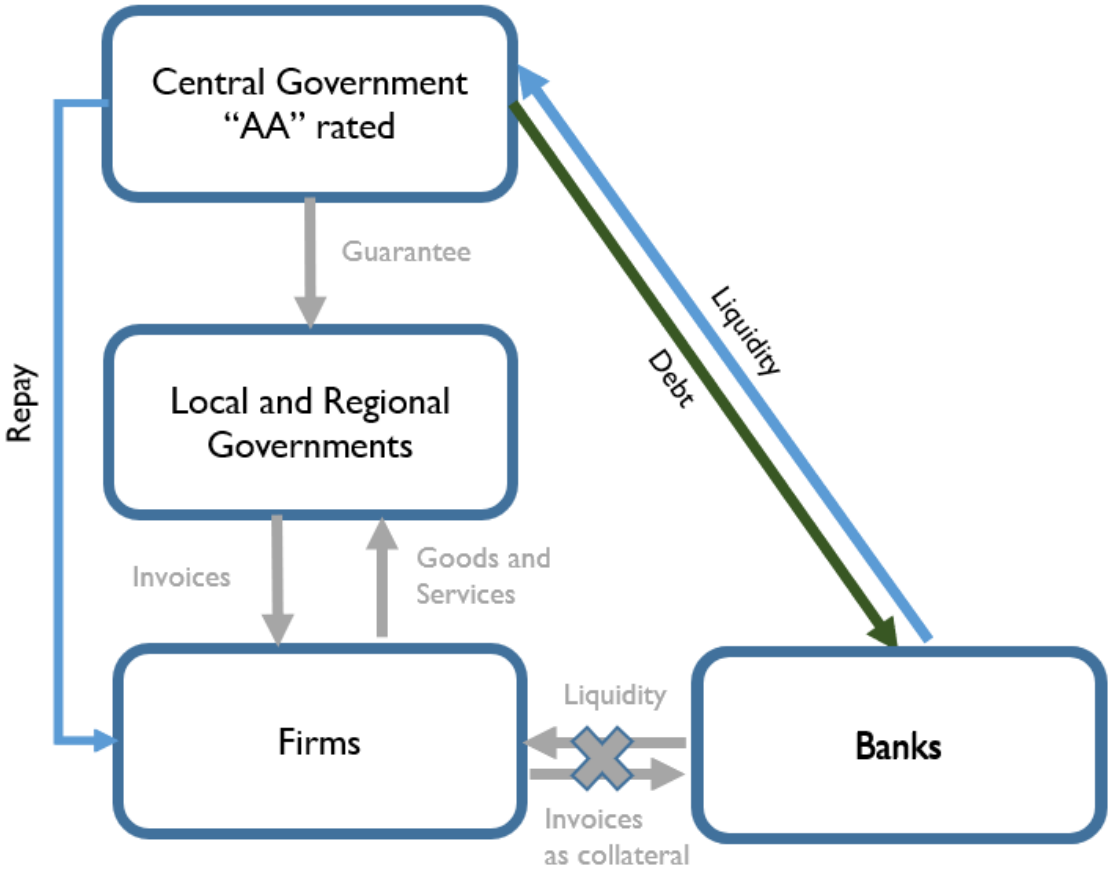




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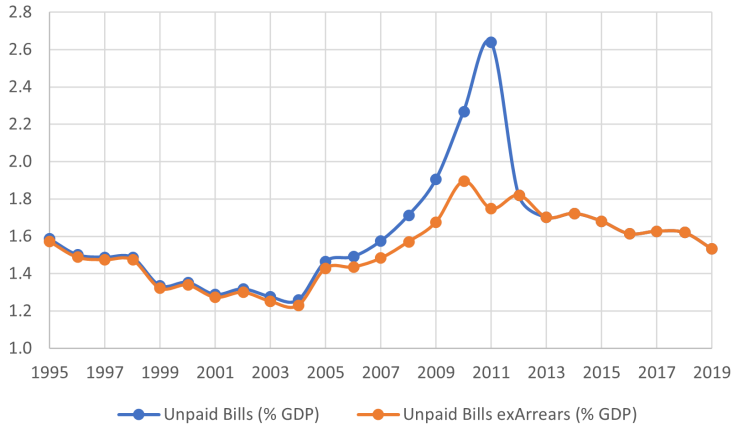
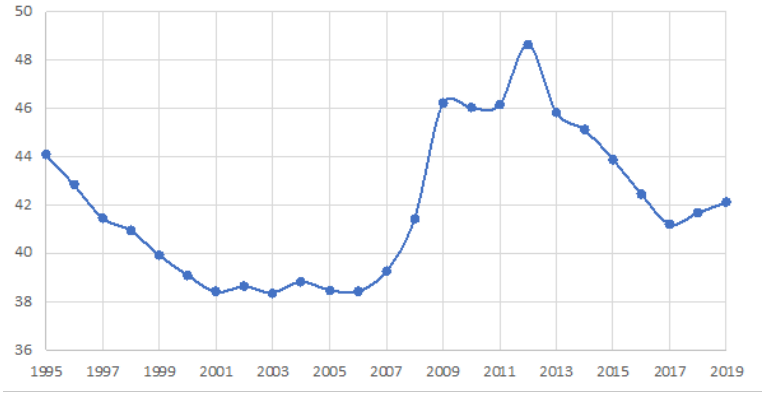
**Figure 3:** Spanish Municipalities

Panel A shows unpaid bills, with and without arrears, as a percentage of Gross Domestic Product (GDP) for Spanish municipalities. Panel B shows the total expenditure as a percentage of GDP for Spanish municipalities. Panel C 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: Unpaid Bills, with & without Arrears (% GDP)




Panel B: Total Expenditure (% GDP)




Panel C: Budget Deficit (% GDP)

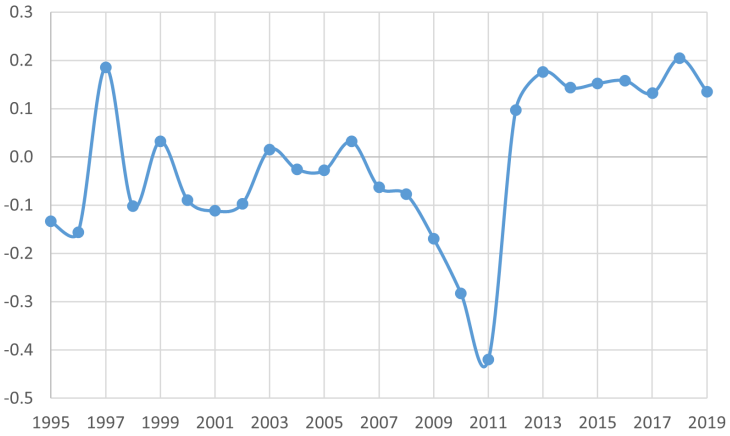





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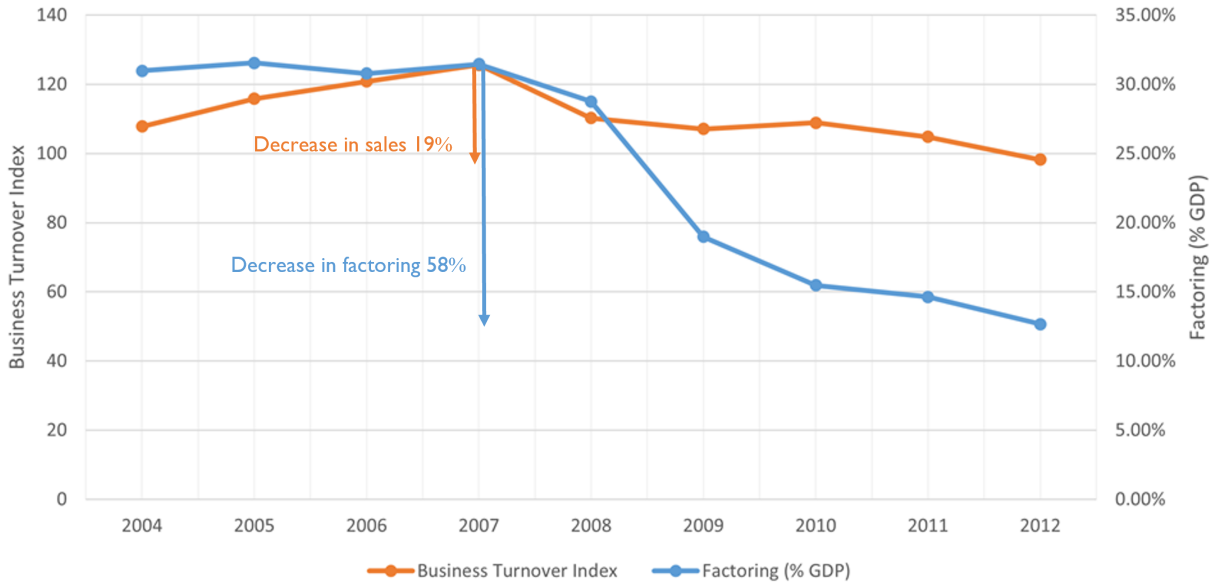
**Figure 4:** Factoring and Business Turnover Index

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 is 2004-2012.



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# Appendix for
# "Government Arrears and Corporate Decisions: Lessons from a Natural Experiment"

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

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

- Figure IA.1: Mancomunidades and Municipalities
- Figure IA.2: Average Payment Delay (Days) per Sector, 2005-11
- Figure IA.3: Factoring of Arrears by Bank Type
- Table IA.1: Descriptive Statistics: 2009-2012
- Table IA.2: Summary Statistics: 2010 and 2009
- Table IA.3: Effects on Corporate Decisions with Firm Fixed Effects

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**Figure IA.1:** 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 join several municipalities to improve bargaining power. Source: add.

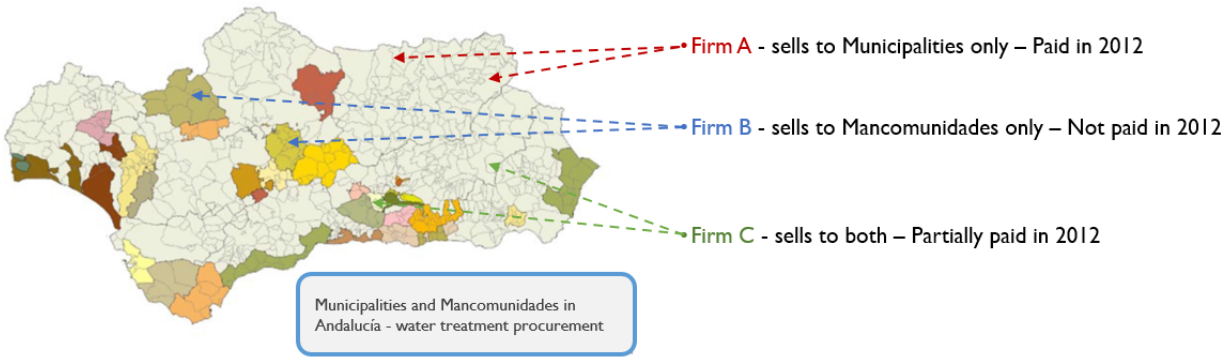




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**Figure IA.2:** Average payment delay (days) per sector, 2005-11

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

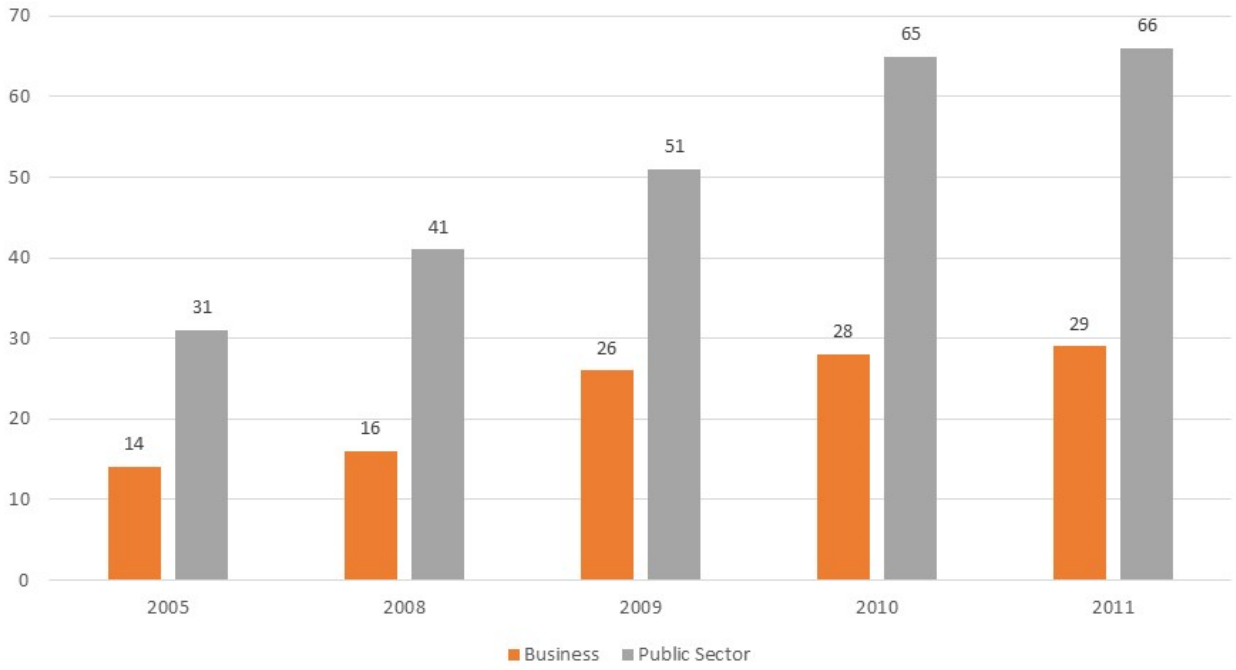




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**Figure IA.3:** Factoring of Arrears by Bank Type

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

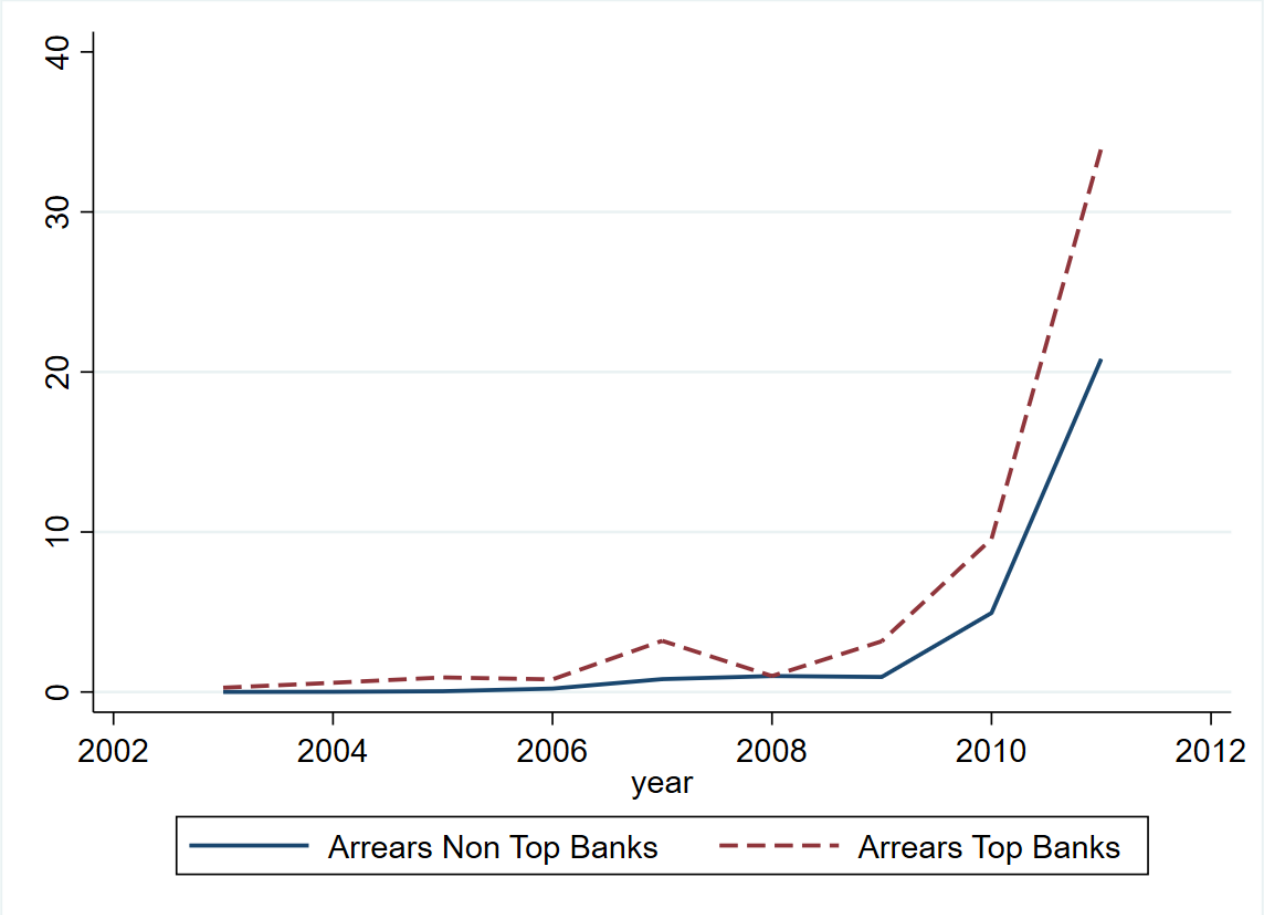




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**Table IA.1:** Descriptive Statistics: 2009-2012

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

| | Mean | Std.Deviation | Perc.25 | Median | Perc.75 | Observations |
|---|---|---|---|---|---|---|
| Liquidity Shock | 125.25 | 1232.91 | 1.69 | 7.30 | 32.48 | 203795 |
| Total assets | 5146.40 | 19227.50 | 383.33 | 890.00 | 2448.00 | 166244 |
| Total liabilities | 3255.29 | 13179.71 | 220.00 | 515.00 | 1392.00 | 166243 |
| Cash | 294.62 | 1000.47 | 14.78 | 53.00 | 179.00 | 155219 |
| Employment to assets | 0.02 | 0.03 | 0.01 | 0.01 | 0.02 | 155888 |
| Leverage ratio | 0.37 | 0.27 | 0.17 | 0.33 | 0.52 | 107068 |
| Total debt | 1528.13 | 4960.33 | 127.00 | 325.00 | 887.00 | 107068 |
| Sales to assets | 1.32 | 1.21 | 0.62 | 1.03 | 1.64 | 158593 |
| Sales growth | -0.02 | 0.53 | -0.22 | -0.07 | 0.05 | 158097 |
| ROE | 10.77 | 111.45 | -0.20 | 8.64 | 24.15 | 165923 |
| Long-term debt | 804.44 | 3082.30 | 41.00 | 148.00 | 438.00 | 123263 |
| Short-term debt | 564.50 | 2041.63 | 26.26 | 93.38 | 298.00 | 134762 |
| Investment | 0.02 | 0.47 | -0.12 | -0.03 | 0.06 | 155881 |
| Leverage growth | -0.02 | 0.44 | -0.18 | -0.02 | 0.13 | 157309 |
| Liquidity growth | -0.05 | 1.08 | -0.60 | -0.04 | 0.47 | 142338 |



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**Table IA.2: Summary Statistics: 2010 and 2009**

This table reports the mean of 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 include the sample of Spanish firms that worked for local government entities that received the liquidity shock in year 2012, and Phase II includes firms that received the liquidity shock in 2013. Firms from Phase I and Phase II are matched based on total assets, liquidity shock, and region. Panel A compares firm characteristics in Phase I and Phase II in 2010. Panel B compares firm characteristics in Phase I and Phase II in 2009.

Panel A: 2010

| | (1) Phase I | (2) Phase II | (3) Difference | (4) P-value |
|---|---|---|---|---|
| Liquidity Shock | 140.266 | 140.262 | -0.003 | (1.000) |
| Total assets | 5,180.161 | 5,180.271 | 0.111 | (1.000) |
| Total liabilities | 3,313.226 | 3,439.100 | 125.874 | (0.829) |
| Cash | 299.621 | 342.933 | 43.312 | (0.710) |
| Employment to assets | 0.017 | 0.017 | -0.000 | (0.939) |
| Leverage ratio | 0.366 | 0.361 | -0.005 | (0.815) |
| Total debt | 1,551.979 | 1,730.285 | 178.306 | (0.629) |
| Sales to assets | 1.396 | 1.463 | 0.066 | (0.392) |
| Sales growth | 0.043 | 0.101 | 0.058 | (0.346) |
| ROE | 13.335 | 2.202 | -11.133 | (0.356) |
| Long-term debt | 813.712 | 781.347 | -32.365 | (0.850) |
| Short-term debt | 578.011 | 701.646 | 123.635 | (0.517) |
| Investment | 0.029 | 0.041 | 0.012 | (0.587) |
| Leverage growth | 0.023 | 0.033 | 0.010 | (0.698) |
| Liquidity growth | -0.057 | -0.004 | 0.053 | (0.367) |
| Observations | 42,708 | 489 | 43,197 | |

Panel B: 2009

| | (1) Phase I | (2) Phase II | (3) Difference | (4) P-value |
|---|---|---|---|---|
| Liquidity Shock | 139.862 | 139.859 | -0.003 | (1.000) |
| Total assets | 5,096.947 | 5,097.059 | 0.112 | (1.000) |
| Total liabilities | 3,277.663 | 3,215.841 | -61.822 | (0.903) |
| Cash | 309.823 | 306.548 | -3.275 | (0.970) |
| Employment to assets | 0.018 | 0.018 | 0.000 | (0.955) |
| Leverage ratio | 0.364 | 0.353 | -0.010 | (0.626) |
| Total debt | 1,506.419 | 1,578.632 | 72.213 | (0.818) |
| Sales to assets | 1.430 | 1.522 | 0.092 | (0.248) |
| Sales growth | -0.048 | 0.021 | 0.069 | (0.081)* |
| ROE | 16.857 | 11.428 | -5.429 | (0.538) |
| Long-term debt | 782.284 | 786.162 | 3.879 | (0.981) |
| Short-term debt | 574.788 | 658.844 | 84.056 | (0.581) |
| Investment | 0.032 | 0.019 | -0.014 | (0.522) |
| Leverage growth | -0.004 | -0.011 | -0.007 | (0.805) |
| Liquidity growth | 0.062 | -0.030 | -0.092 | (0.167) |
| Observations | 42,394 | 468 | 42,862 | |



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**Table IA.3:** Effects on Corporate Decisions with Firm Fixed Effects

This table presents estimates from panel matching regressions explaining corporate decisions for the period 2009 to 2012. Firms from Phase I and Phase II are matched based on total assets and liquidity shock. 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). *Phase I* is a dummy that takes a value of 1 for firms that received liquidity in Phase I (2012) and zero for firms that received liquidity a year later in Phase II. *Post 2012* is an indicator that equals 1 for year 2012. We sort our sample into firms that received a liquidity shock below 1% of their total assets, between 1% and 5%, between 5% and 10%, and above 10%. All regressions include year and firm fixed effects. Robust T-statistics are clustered at the firm level and shown in parentheses. ***, ** or * indicates that the coefficient is significant at the 1%, 5%, or 10% level, respectively.

| | Investment | | | |
|---|---|---|---|---|
| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
| Phase I × Post 2010 | 0.006 | 0.003 | -0.009 | -0.078 |
| | (0.20) | (0.12) | (-0.26) | (-1.51) |
| Phase I × Post 2011 | -0.022 | -0.024 | -0.014 | -0.006 |
| | (-0.61) | (-0.65) | (-0.36) | (-0.16) |
| Phase I × Post 2012 | 0.040 | 0.053 | 0.062* | 0.096*** |
| | (1.17) | (1.53) | (1.72) | (2.68) |
| Year FE | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Observations | 78135 | 40633 | 14764 | 17980 |
| Adjusted $R^2$ | 0.078 | 0.072 | 0.051 | 0.058 |

| | Leverage Growth | | | |
|---|---|---|---|---|
| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
| Phase I × Post 2010 | 0.011 | -0.026 | -0.043 | -0.123* |
| | (0.28) | (-0.67) | (-0.98) | (-1.80) |
| Phase I × Post 2011 | 0.024 | 0.017 | 0.005 | 0.017 |
| | (0.64) | (0.45) | (0.12) | (0.40) |
| Phase I × Post 2012 | 0.004 | 0.016 | -0.007 | -0.133*** |
| | (0.11) | (0.42) | (-0.17) | (-2.74) |
| Year FE | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Observations | 78624 | 41051 | 14937 | 18346 |
| Adjusted $R^2$ | 0.042 | 0.033 | 0.011 | 0.026 |

| | Liquidity Growth | | | |
|---|---|---|---|---|
| | $< 1\%$ | $1\% - 5\%$ | $5\% - 10\%$ | $> 10\%$ |
| Phase I × Post 2010 | -0.110 | -0.107 | -0.138 | -0.131 |
| | (-1.26) | (-1.18) | (-1.33) | (-0.83) |
| Phase I × Post 2011 | 0.017 | -0.018 | -0.010 | 0.051 |
| | (0.20) | (-0.21) | (-0.11) | (0.54) |
| Phase I × Post 2012 | 0.064 | 0.111 | 0.210** | 0.462*** |
| | (0.76) | (1.32) | (2.32) | (4.42) |
| Year FE | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Observations | 70646 | 36788 | 13426 | 16435 |
| Adjusted $R^2$ | -0.156 | -0.156 | -0.170 | -0.164 |



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