Rechargeable Collateral and Bank Lock-in*

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This version: November 12, 2026

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Abstract

Collateral law can let firms commit to exclusive bank relationships. In many euro area countries, a firm and its bank can secure new loans under the bank's existing claim on real estate, up to the claim's registered amount and ahead of later liens. We call this right recharge. In a model with symmetric information, the threat of subordinating outside lenders gives the incumbent a markup on follow-up financing. Banks subsidise the initial loan with the expected markup, which lowers default. Consistent with the subsidy, loans secured by real estate new to the bank are 14 basis points cheaper than those secured by real estate it already holds a claim on. The discount does not appear in countries without recharge. After procurement awards, which would erode the incumbent's information advantage, firms locked in by recharge pay 21 basis points more than firms with the same excess collateral in countries without recharge. Firms in recharge countries, especially small ones, are twice as likely to pledge real estate and have 63% higher tangibility. By assigning exclusivity over future seniority, property law shapes how firms borrow and invest.

JEL classification: G21, G32, G33, K11
Keywords: collateral, seniority, relationship lending, hold-up, property law, real estate

*We are especially grateful to Daniel Paravisini, Martin Oehmke, and Vicente Cuñat for their guidance. We also thank Oliver Ashtari Tafti, Ulf Axelson, Constantin Charles, Manav Chaudhary, Kim Fe Cramer, Jason Donaldson, Nicolas Garrido Sureda, Antoine Hubert de Fraisse, Tarun Ramadorai, Veronica Rappaport, Arthur Taburet, and seminar participants at LSE for helpful comments. All errors are our own. The views expressed represent exclusively the authors' own opinions and do not necessarily reflect those of the ECB or the Eurosystem.

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1 Introduction

Collateral should make it easier for firms to switch banks. Secured lenders need to know less about the borrower since collateral substitutes for information (Bester, 1985) and weakens screening incentives (Manove et al., 2001). Without an information advantage, banks cannot hold firms up (Sharpe, 1990; Rajan, 1992), making secured lending more competitive. Yet, in the euro area, where half of firms' bank debt is secured,[1] firms with pledged real estate are 14% less likely to take their new credit from a new bank than firms without collateral.[2] The exclusivity that collateral should erode can be valuable to firms. If lenders cannot share in a firm's later success, they are not able to offer favourable rates today. Competition can therefore restrict financing for long-term projects (Petersen & Rajan, 1995). How do firms with secured debt credibly commit to exclusivity?

We propose that collateral commits the firm to its lender through a legal feature, which we call *recharge*. In many euro area countries, a firm and its lender can agree to secure a new loan under the lender's existing claim on real estate, which makes up two thirds of collateral. The recharged loan inherits the seniority of the original registration, subordinating any lien that other lenders registered since. Once a lender establishes seniority, only that lender can lend against the part of the claim that exceeds the outstanding debt. The excess arises when the claim is registered above the initial loan and grows with each euro repaid. Unlike a covenant, which does not invalidate a lien granted in breach of it (Bjerre, 1999), the recharge right binds other lenders.

Because recharge binds outside lenders, an outside bank prices the expected subordination, while the incumbent can lend more cheaply. This cost wedge restores the incumbent's market power. In relationship banking models this is generated by private information, while we derive it with recharge under symmetric information. Banks compete for the loan that initially registers the collateral, so the incumbent's future markup is anticipated, and banks subsidise the initial loan. Recharge allows the firm to credibly commit to exclusivity by

[1] See also Degryse et al. (2026), who include financial guarantees, which we exclude from our definition of collateral.

[2] Within country, industry, size class and month (Table 4). The median firm borrows from one bank (Kosekova et al., 2025), including those with secured debt.

exposing itself to collateral hold-up. As a result, it can pledge future cash flows to the lender today, enabling the financing of some projects that would have otherwise been unfunded.

We first develop an investment model to show when firms benefit from commitment through recharge and to generate predictions about secured loan pricing, which we test in AnaCredit, the euro area credit registry. We find that loans secured by newly pledged real estate are 14 basis points cheaper than loans secured by re-pledged real estate in recharge countries. The discount is absent in countries without recharge, our placebo, and is significantly different from theirs. We then estimate the markup in public procurement, where we observe firms' investment opportunities, and show that firms locked in by recharge pay 21 basis points more after an award than firms with excess collateral in countries without recharge, where any bank can lend against it. Lastly, firms in recharge countries are twice as likely to pledge real estate and hold more tangible assets, especially small firms.

Collateral laws in euro area countries differ in which party, if any, can reuse the part of a claim that exceeds the debt it secures. In Germany, Austria, Belgium, and the Netherlands, the incumbent can reuse it at the original seniority to secure any new loan, and in Spain only to top an amortised loan back up to its original amount. We call these five countries recharge countries, and they hold 55% of euro area corporate bank debt. In France, the firm can reuse it at the original seniority with any lender, without the incumbent's consent,[3] so the excess does not tie the firm to its bank. In Italy, any new loan needs a new junior lien. France and Italy, with 33% of corporate bank debt, are our non-recharge countries. Recharge shows up in the data: in AnaCredit 49% to 86% of pledged properties secure more than one loan in Austria, Belgium, Germany, and the Netherlands, against 11% in France and 25% in Italy. Counting loans per asset misses Spain's recharge, which tops up the existing loan rather than adding a new one.

Recharge is difficult to replicate or avoid by contract. Collateral claims are property rights that are enforceable against third parties, while contractual rights are only enforceable against contracting parties (Ayotte & Bolton, 2011; Donaldson, Gromb, & Piacentino, 2025). Credit lines can create a similar threat (Donaldson, Koont, et al., 2025), but to

[3] Aretz et al. (2020) note that "mortgages would allow for sequential addition of new creditors", which falls outside our definition of recharge.

replicate recharge they need to be secured, state-contingent, and revocable by the bank. In non-recharge countries, only 1% of revolving credit is secured by real estate, against 16% in recharge countries. Conversely, firms cannot easily contract around recharge, since contractual rights do not invalidate property rights.

We model recharge for a firm with two sequential investment opportunities, symmetric information, competitive banks, and secured non-contingent one-period debt. Collateral assigns seniority as in Donaldson et al. (2020), and default induces liquidation of assets. Since the firm cannot commit not to subordinate an outside bank, recharge worsens its outside option for the follow-up loan. The incumbent bank has market power and can charge a markup on the follow-up, which arises only if the firm succeeds. Banks subsidise the initial loan with the expected markup, so repayment in states where the firm succeeds cross-subsidises states in which it fails, reducing default. When the markup is large enough, recharge replicates state-contingent debt, restores the first-best, and can finance projects that non-contingent debt cannot. Firms in non-recharge countries cannot shift repayment across states this way. The gain from recharge increases in the firm's tangible assets in place and in the risk of its follow-up project.

In AnaCredit, banks report every pledged asset under an identifier that persists across loans and months within a firm-bank relationship. We therefore observe when a property is first pledged to a bank and every loan it secures after. From the protection value the bank allocates to each loan, we estimate a lower bound on the registered amount of the claim. We call the estimated claim less the outstanding debt it secures *excess collateral*, the amount that can be used for recharge, and its ratio to the estimated claim the *lock-in share*. A firm in recharge countries can be locked in at a bank when it has excess collateral there. We also observe recharge itself in banks' collateral accounting. In the month a new loan is secured by a property that is already pledged to other loans from the same bank, the amount allocated to those existing loans falls by 7.8%. The bank moves excess collateral, and with it seniority, from the amortised loans to the new one. This shift exists only in recharge countries. We merge the data with Orbis balance sheets and procurement awards from Tenders Electronic Daily.

In recharge countries, banks compete for and subsidise loans secured by real estate new

to the relationship, which establish a new claim. Loans secured by re-pledged real estate are recharged and carry the markup. The difference between their interest rates, the discount, therefore measures the sum of the subsidy and the markup. We account for selection in the relationship and for bank-level shocks over time with relationship and bank-time fixed effects, and control for time-varying firm risk with bank-reported twelve-month default probabilities. Loans secured by new real estate have longer maturities and are larger, so we compare loans with contract term fixed effects.

We estimate a discount of 14 basis points in recharge countries and none in non-recharge countries. The null result alleviates concerns about remaining selection, such as firms that invest and pledge newly acquired real estate. Unobserved investment opportunities not captured by the default probability should also lower rates in non-recharge countries. The alternative commitment mechanism of information asymmetry predicts a discount only for loans that start a relationship. We show that the discount is as large when new real estate enters an existing relationship of up to three years as when it starts a new one, so it attaches to the asset rather than the relationship.

We identify the markup separately with a plausibly exogenous shock to investment opportunities: first-time public procurement awards. Winning an award causally increases firm growth, investment, and survival and eases credit conditions (Bonfim et al., 2025; di Giovanni et al., 2025; Hebous & Zimmermann, 2021; Gabriel, 2024). We show that awards in the largest tercile of award size relative to total assets raise debt over assets by 6% of the mean book leverage and leave the rate unchanged. We therefore use them as a credit demand shock.

We compare first-time winners with excess collateral to not-yet-winners, similar firms with excess collateral that win at least a year later. Both groups compete in public procurement, and we assume the timing of the win is exogenous, since in sealed-bid tenders, bidders do not know who else bids. Firms in non-recharge countries are the counterfactual to estimate the effect of freely usable excess collateral on firms' credit access. Firms in recharge countries, in contrast, have their excess collateral committed to the incumbent. Under the assumption that, absent recharge, the award would change the cost of lending for winners with excess collateral by the same amount in recharge and non-recharge countries, the difference in rates

identifies the incumbent's market power.

We estimate a markup of 21 basis points after the award, for firms with any excess real estate collateral, relative to not-yet-winners and the non-recharge counterfactual, while their debt does not respond differently. In non-recharge countries, France and Italy, winners with excess collateral pay 18 basis points less after the award, while rates do not change in recharge countries. The markup is the rate cut from excess collateral that the incumbent does not pass on to a locked-in firm. The composition of debt and risk of borrowers evolves comparably.

The markup rises with the lock-in share. Since firms chose their repayment schedules before the award, some have repaid most of their debt by the time they win and others little, and those with most debt repaid are most locked in. Per unit of lock-in share, the rate gap between recharge and non-recharge countries widens by 60 basis points. As with the level estimate, the rate falls with the share in France and Italy, while it does not move in recharge countries. Once firms are locked in by recharge, they do not benefit from real estate in excess of their debt. In the model, they received a subsidy when they first pledged the asset.

Informational lock-in, the main alternative mechanism, would make rates fall after an award, the opposite of what recharge predicts. Since awards are public, outsiders can evaluate a firm's investment opportunity, which erodes the incumbent's information advantage the most in intense relationships, as in Schenone (2010). Consistent with this, in France and Italy, winners whose relationship with their incumbent lasted 13 to 36 months or began before AnaCredit pay 19 to 22 basis points less after the award than winners in relationships of up to 12 months, relative to their not-yet-winner controls. In recharge countries, where relationship length can correlate with recharge lock-in, the difference is not significant. Since awards level the incumbent's information advantage, the markup that firms locked in by recharge pay after an award is not explained by informational lock-in.

Lastly, we study the implications of recharge for firms' financing and investment choices. In the model, recharge is most valuable to firms with real estate in place, typically established firms, which can commit to exclusivity to finance long-term, risky projects. In the data, firms in recharge countries are twice as likely to use real estate as collateral and, outside the real estate sector, have 63% higher asset tangibility, also within industry and size class. These

gaps fall in firm size, and the gap in pledging real estate rises in firm age. Recharge matters most for small firms, which have less access to alternative sources of external financing (Ferrando et al., 2017). Young firms, in contrast, only build up real estate over time, so the commitment that restores the first-best in the model is not available to them.

Recharge is a live legal issue: in a ruling published in March 2026, the Spanish authority that hears land-registry appeals held that a borrower can irrevocably waive the recharge right in favour of a junior lender without the incumbent's consent.[4] A firm that can give the incumbent's priority away ex post cannot commit to its bank ex ante. If the ruling holds, Spanish firms lose the commitment that recharge provides.

Related literature. We contribute to the literature on commitment to exclusive lending relationships. The sources of the incumbent's market power are market concentration (Petersen & Rajan, 1995) or private information (Sharpe, 1990; Rajan, 1992), and empirical work measures the resulting rents (Santos & Winton, 2008; Ioannidou & Ongena, 2010; Schenone, 2010). We derive the same cost wedge from a property right under symmetric information, show that the right is priced, and find evidence consistent with firms using it to commit to their lender. In Rajan (1992), the firm chooses the priority of its debt to limit the bank's power, while under recharge, priority creates it. Closest to our result that incumbent lenders value future seniority is Degryse et al. (2016), who show that an incumbent cuts its lending less after the firm takes an outside loan if its existing and future loans retain seniority. We show that the same feature lets the incumbent subordinate outside lenders, which ties the firm to it. This channel of commitment is most used by small and medium-sized enterprises, for whom relationship lending matters most (Hombert & Matray, 2017).

We also contribute to the literature on the function of collateral. Collateral determines debt capacity (Rampini & Viswanathan, 2010, 2013), lowers the cost of debt (Benmelech & Bergman, 2009), mitigates asymmetric information (Bester, 1985; Berger et al., 2011; Ioannidou et al., 2022), and reduces banks' incentive to produce information (Manove et al., 2001; Howes & Weitzner, 2025; Zhao, 2026). It can also commit the firm not to dilute its

[4]The decision falls at the end of our sample and notes that recharge in its previous form favours creditors once a claim is established. Resolución de la Dirección General de Seguridad Jurídica y Fe Pública de 24 de noviembre de 2025, BOE núm. 64, de 13 de marzo de 2026, Sec. III, pp. 39062-39068 (BOE-A-2026-5940).

creditor (DeMarzo, 2019; Donaldson et al., 2020; Donaldson & Piacentino, 2025). We show that it can commit the firm to borrow from the same bank again. High-quality borrowers retain financial flexibility by granting security only when they approach distress (Benmelech et al., 2024), while in our model firms benefit from pledging real estate when healthy. Collateral and seniority have been shown to complement relationship lending by strengthening the bank's incentives to monitor and support the firm (Rajan & Winton, 1995; Longhofer & Santos, 2000; Cerqueiro et al., 2016). In our setting, the complementarity runs through the firm's commitment rather than the bank's incentives.

Lastly, we contribute to the literature on how collateral law shapes lending and investment choices. Collateral laws shape debt structure (Vig, 2013), recovery rates and the composition of collateral (Degryse et al., 2020), and the allocation of resources across sectors (Calomiris et al., 2017). We study a feature of property law that, to our knowledge, the literature has not examined: who can secure future loans at the seniority of an existing claim. Assigning this right exclusively to the incumbent bank creates a commitment that is difficult to replicate with contracts. Like weak laws for movable collateral in Calomiris et al. (2017), it tilts lending and investment towards real estate. Aretz et al. (2020) study a French reform that eases the pledge of physical assets generally, including recharge that is not restricted to the incumbent, and show that credit access and real outcomes improve for small, young, and constrained businesses.

2 Establishing an asset claim

We begin by outlining how lenders legally establish a valid claim on real estate collateral.[5] While the specifics vary by country, there are shared principles across the legal frameworks in the euro area. A lender needs to register a claim on an asset to make its security interest effective against other creditors. It identifies a specific property and states a nominal amount, the maximum that the lender can recover from the asset. This specificity requirement rules out blanket liens and floating charges, which cover an entire class of assets. Seniority is established through the order of registration, with the earliest entry ranking highest. In

[5] Appendix A lists the legal sources for this section by country.

default, the security interest provides the lender with the right to a forced sale of the property. In insolvency, it conveys the right to separate satisfaction, meaning payment out of the proceeds of the specific asset, from the insolvency estate. Registration is costly, requiring administrative and notarial processes. Claims either secure a specific loan or are linked to the whole lending relationship.[6]

In many countries, an existing claim can secure newly issued debt at its original rank, which we call *recharge*. It arises in two instruments. The first instrument is a claim that separates the security right from any specific debt. It links the claim to the overall lending relationship, covering all current and future loans from the lender from the outset. As the relationship changes, so can the secured debts while the claim retains the original rank. New loans issued under the claim rank ahead of any liens other lenders registered in the interim. Claims covering the overall lending relationship can be registered for any amount and are usually entered above the initial debt to create headroom for interest and other payments. The firm can demand the claim's cancellation when a lending relationship ends.

The second instrument is a mortgage that can be topped back up by the amortised portion of the loan, similar to a credit line. The difference from revolving instruments is that any top up requires agreement between the lender and firm. Because a claim is costly to establish and tied to a specific lender, recharge provides an ex-post advantage to the incumbent lender. Whenever the registered nominal amount exceeds the outstanding debt backed by the claim, junior lien holders face the threat of future dilution, locking the firm into its existing lender.

[6]The link between the claim and the underlying debt is established either directly through an "accessory" claim (mortgage) or through a separate contract, the security agreement. In the latter case, the claim is "non-accessory" (land charge) and exists separately from any specific debt and can be contracted to cover any debts owed to the lender. Accessory claims are the norm, with the notable exception of Germany, which separated debt from security rights in the nineteenth century. As loans with accessory claims are repaid, a bank's claim to liquidation proceeds declines proportionally. Once the debt on an accessory claim is repaid, the claim ceases to exist, while a non-accessory claim survives. The persistence of non-accessory claims does not translate to higher recovery in default because release clauses in security agreements link recovery rights to amortising loan amounts. In Germany, the security agreement obliges the bank to release security it no longer needs. For revolving security over inventory and receivables, the Federal Court of Justice implies such a release claim once the realisable value of the security exceeds 110% of the secured debt, presumed when its estimated value exceeds 150%.

2.1 Country comparison

We analyse the recharge mechanism across the seven largest countries in AnaCredit by total outstanding debt. They make up 88% of total debt and are, in descending order, Germany, Italy, France, Spain, Austria, Belgium, and the Netherlands. We analyse each country along three dimensions in Table 1: (1) whether an existing claim can be recharged and who holds that right, (2) the degree of rank retention on new loans, and (3) the frictions to refinance the existing debt with a new lender.

Table 1: Recharge in the seven largest AnaCredit countries

	Rechargeable claim	Recharge right held by	Rank of new debt	New claim cost (%)	Prepayment penalty cap
Recharge countries					
Germany	Land charge	Incumbent bank	Original	0.3–0.5	None
Austria	Maximum-amount mortgage	Incumbent bank	Original	1.2	None
Belgium	Maximum-amount mortgage	Incumbent bank	Original	1.4	6 months' interest
Netherlands	Maximum-amount mortgage	Incumbent bank	Original	0.1	None
Spain	Rechargeable mortgage	Incumbent bank, same loan only	Original if unchanged	0.8–2.1	Small firms
Non-recharge countries					
France	Rechargeable mortgage	Firm, any lender	Original	1.1	None
Italy	None	No recharge	Most junior	0.4	None

Notes: This table summarises how the mortgage laws of the seven largest AnaCredit countries treat recharge. Rechargeable claim and recharge right: the claim that secures new debt at its original rank once the initial loan amortises, and who can use it. Mortgages for future debts in France and Italy secure only an existing credit facility, such as a credit line. Rank of new debt: relative to liens that other lenders registered in the meantime. In France, a recharge ranks only from its own publication against statutory and court-ordered liens; in Spain, it keeps its rank only if it neither raises the secured amount nor extends the term. New claim cost: taxes and fees of a first-ranking claim, as a share of its registered amount. A recharge is free in Germany, Austria, Belgium, and the Netherlands, and pays stamp duty on the added amount in Spain. Prepayment penalty cap: the statutory limit on penalties for early repayment of business loans. German law entitles lenders to compensation for lost interest in the first ten years of a fixed-rate loan. National names and legal sources in Appendix A.

Corporate loans commonly carry prepayment penalties, which compensate lenders for foregone interest on fixed-rate loans. Floating-rate loans reprice and incur no funding loss. Only Belgium and Spain cap these penalties, and only for some loans (Table 1). Prepayment penalties and the cost of registering a new claim, 0.1 to 2.1% of its registered amount, make it costly for the firm to refinance all debt secured by the asset with a new lender, repay the

incumbent and cancel its claim, which would remove the threat of future dilution.

France introduced a rechargeable mortgage (*hypothèque rechargeable*) in 2006 as one of the "major innovations" of a reform to make security rights "readable and efficient". Unlike in the five recharge countries, however, the recharge right belongs to the firm, which can offer the recharge to the original or to any new lender without the incumbent's consent. The law voids contractual clauses that restrict recharge, including clauses that reserve it for the incumbent. As we show in the model, recharge gives the incumbent market power through exclusive access to the asset in the future, not by saving costs for the firm.

Combining the three dimensions, the recharge right is strongest in Germany, where recharge is fully contractible given the non-accessory land charge; followed by Austria, Belgium, and the Netherlands with their maximum-amount mortgages; and weakest in Spain, where recharge of the market-standard instrument is limited to the original loan agreement. We pool these five countries into "recharge countries" when analysing aggregate effects. In France and Italy, the incumbent cannot use the seniority that repayment frees, so the excess claim cannot tie the firm to its bank. They form the non-recharge group and serve as the placebo in all our empirical tests.

Outside the euro area, recharge is limited. In the United States, rank is only retained with an intervening junior lien if the lender was obliged to advance the recharge, and not if it was optional. Given that loan advances are often subject to conditions, rank retention is less predictable. Many states override the rule by statute, usually up to a maximum stated in the mortgage and often with a cut-off notice, for example Florida, Iowa, Maryland, Missouri and, since 2023, Washington, and for credit-line mortgages New York, Oregon and Virginia.

3 Model

We model recharge in a two-period model to show when it gives the incumbent market power over the firm's follow-up financing, and when this market power increases firm value. The firm cannot commit to borrow the follow-up financing exclusively from its initial bank. Recharge gives the existing lender exclusivity over future seniority on the firm's initial assets. This gives the lender market power under which it can extract a markup. Ex-ante, banks

compete over the future expected markup, lowering the cost of initial financing. Repayment in states where the firm succeeds cross-subsidises states in which the firm fails, reducing overall default. The model shares this cross-subsidy with Petersen and Rajan (1995), but the incumbent's market power stems from a property right under symmetric information rather than from market concentration or an information monopoly (Sharpe, 1990; Rajan, 1992). As in DeMarzo (2019) and Donaldson et al. (2020), collateral provides commitment, here to a lender rather than to future leverage. Like the credit lines in Donaldson, Koont, et al. (2025), recharge threatens outside lenders with dilution.

3.1 Setup

A risk-neutral firm has an investment opportunity of fixed scale I_0 at $t = 0$ and can expand the project at $t = 1$ at fixed scale I_1. The firm is penniless and must finance both investments from competitive, risk-neutral banks. The risk-free rate is zero. The project pays an intermediate payoff X_1 at $t = 1$, which is high, $\overline{X}_1$, with probability $1 - p$ in the good state, and low, $\underline{X}_1$, with probability p in the bad state. The follow-up investment is only available in the good state and pays $X_2 \in \{\underline{X}_2, \overline{X}_2\}$ at $t = 2$, with $\underline{X}_2 < \overline{X}_2$ and $\Pr(X_2 = \underline{X}_2) = q$. The high final cash flow is large enough that the firm always repays its debt in the high state.

Each investment generates tangible assets $\zeta_t I_t$, with $\zeta_t < 1$, which do not depreciate, while the intangible part has no liquidation value. The firm winds down after the bad state or after the final cash flow and defaults if its pledgeable output, its cash on hand plus tangible assets, is less than its outstanding debt. Default causes a liquidation of assets, which are sold at a fraction $\gamma < 1$ of their fair value, and cash on hand is seized.[7]

The total project is NPV positive, $\mathbb{E}(X_1) + (1-p)\mathbb{E}(X_2) > (1-\zeta_0)I_0 + (1-p)(1-\zeta_1)I_1$, and so is the follow-up even if all tangible assets are sold at a fire-sale in the low final state, $\mathbb{E}(X_2) - (1-\zeta_1)I_1 \geq q(1-\gamma)(\zeta_0 I_0 + \zeta_1 I_1)$. The first-best undertakes both investments,

[7] In distress, we rule out that banks renegotiate their outstanding debt to avoid the fire-sale. Most small firms that default on bank debt in France, Germany, and the UK end in formal bankruptcy, where banks recover much less than in out-of-court workouts (Davydenko & Franks, 2008). With costless renegotiation, banks would write down debt in the bad state to the firm's pledgeable output, replicating the state-contingent benchmark below, and recharge would have no value.

and the firm expands whichever bank finances the follow-up. The intangible part of the investment, $(1-\zeta_t)I_t$, is not recovered when the firm winds down, so the project needs to generate enough cash to make it worthwhile.

We restrict the contract space to one-period non-contingent secured debt based on the assumption that collateral claims are specific (section 2). The firm cannot commit to its follow-up lender at $t=0$ because it cannot pledge $\zeta_1 I_1$, which does not exist yet, on a contract at $t=0$. Once the asset is created, the firm gains by pledging it to an outsider, diluting a contract that finances both investments at $t=0$, and distributing the cash to shareholders. The equilibrium outcome with one-period loans is equivalent to the outcome with two-period contracts.

A loan contract L_t lends ℓ_t against a repayment F_t one period later and is secured by a registered claim on specific assets, $\zeta_s I_s$, with $s \leq t$. Collateral assigns seniority (Donaldson et al., 2020). In default, claims are repaid from the asset's liquidation proceeds in order of registration, up to their outstanding debt. Cash and unsecured asset proceeds are shared pari passu among remaining claimants.

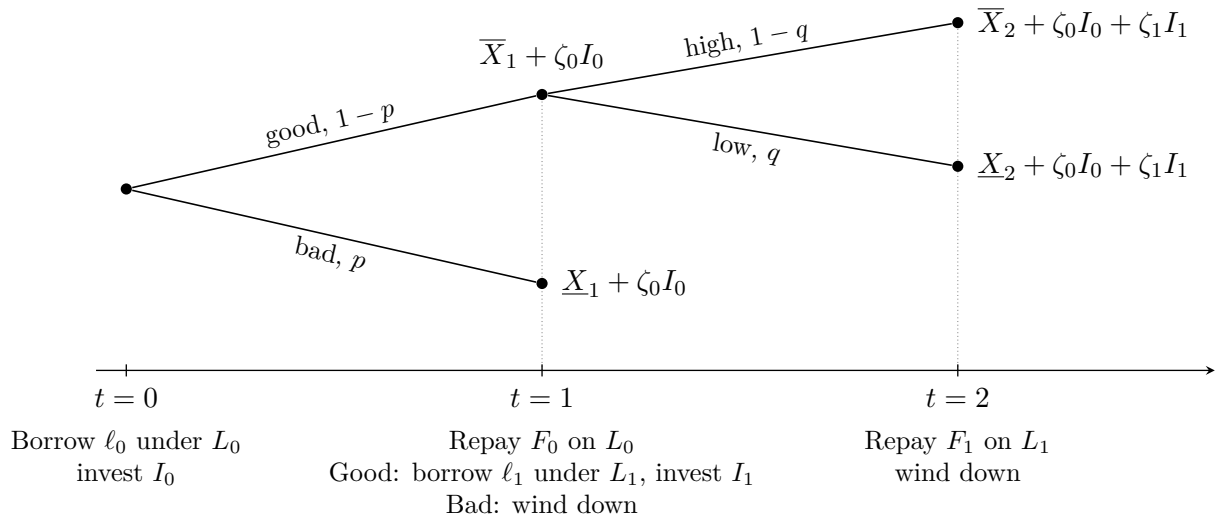
Recharge lets the initial lender lend again at $t=1$ against its claim on $\zeta_0 I_0$, at the claim's original rank, after F_0 is repaid. With one-period contracts, we model recharge as maximum amount mortgages and land charges in which the claim survives repayment of the loan. We assume that the firm cannot cancel it before $t=2$. We discuss relaxing the cancellation restriction with cancellation and registration costs in subsection 3.4. Recharged debt is senior to any follow-up debt secured by a junior lien on $\zeta_0 I_0$, and a recharged loan is limited to the liquidation value of the collateral that secures it and priced to break even. Apart from recharge, the firm cannot raise new debt after the follow-up investment.[8]

Figure 1 shows the timeline. At $t=0$, banks offer initial contracts L_0, and the accepted bank becomes the incumbent. In the good state at $t=1$, outsiders offer follow-up contracts L_1^{out} and the firm bargains with the incumbent over L_1^{inc}. The firm borrows from one lender

[8]We motivate this assumption with a maximum debt covenant. Since the firm cannot commit to stop borrowing, the final cash would end up with unsecured lenders (Bizer & DeMarzo, 1992) making the firm default in all states. With a covenant, the existing secured lenders can accelerate their debts. Since secured lenders only recover their collateral once the firm has promised all cash to unsecured lenders, they lose nothing by accelerating once extra unsecured debt is taken out. Unsecured creditors recover nothing in equilibrium and are discouraged from lending in the first place (Donaldson, Gromb, & Piacentino, 2025).

and, if the lender is an outsider, jointly chooses with the incumbent whether to recharge the initial claim.

Figure 1: Timeline and pledgeable output



Notes: This figure illustrates the timing of the model and the firm's pledgeable output in each state: its cash on hand plus tangible assets at $t = 1$, before debt is repaid and I_1 is made.

Definition 1 (Equilibrium) *An equilibrium is a subgame perfect equilibrium of this game in which the incumbent's follow-up contract L_1^{inc} is the generalised Nash bargaining solution: the incumbent receives a share λ of the surplus over the firm's best outside offer.*

Competition implies that outsiders break even on L_1^{out} and that the incumbent breaks even on L_0 once its expected profit on L_1^{inc} is counted. We solve the game by backward induction: we characterise the recharge choice after the firm borrows from an outsider, the bargaining over L_1^{inc}, and the competition over L_0. Proofs are in Appendix B.

3.2 Contracting without recharge

The baseline contract features non-contingent debt. To rule out that non-contingent debt can achieve the first-best, we assume that the pledgeable output in the bad state is insufficient to cover the initial investment cost:

Assumption A1 $I_0 > \underline{X}_1 + \zeta_0 I_0$.

With non-contingent debt and without recharge, the firm defaults in the bad state. The initial loan $L_0^{*,\text{nc}}$ raises $\ell_0 = I_0$ and repays $F_0^{\text{nc}} = (I_0 - p(\underline{X}_1 + \gamma\zeta_0 I_0))/(1-p)$, since the bank cannot recoup funds later. Default in the bad state reduces total surplus by $p(1-\gamma)\zeta_0 I_0$, the expected fire-sale discount of tangible assets.

We assume that the firm has enough pledgeable output once it takes on the final project to stay solvent with non-contingent debt:

Assumption A2 $\underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 \geq I_1 - \overline{X}_1 + F_0^{nc}$.

The total tangible value of the investments and the cash flow in the low state are enough to repay total non-contingent debt. Under A2, the firm's equity is non-negative in every state, so non-contingent debt finances every project and its only cost is the fire-sale in the bad state.

The non-contingent follow-up loan $L_1^{*,\text{nc}}$ raises $\ell_1(F_0) = I_1 - \overline{X}_1 + F_0$ for a given initial repayment F_0, is secured by all tangible assets, and under A2 is risk-free, $F_1 = \ell_1$. The incumbent and outside banks offer the same loan $L_1^{\text{out}} = L_1^{\text{inc}}$. This is the regime in France and Italy (section 2).

Since the firm stays solvent when it finances the follow-up project, it has a residual claim. We define the firm's residual claim in the low final state as

$$W(F_0) = \underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 - \ell_1(F_0), \tag{1}$$

which falls one for one in F_0. The higher the initial face value, the larger the follow-up loan, which lowers the residual claim. By A2, W is non-negative for an initial loan priced at break-even without exclusivity.

State-contingent benchmark. With state-contingent debt, the first-best is achievable. The initial loan $L_0^{*,\text{sc}}$ raises $\ell_0 = I_0$ and repays $\underline{F}_0 = \underline{X}_1 + \zeta_0 I_0$ in the bad and $\overline{F}_0 = (I_0 - p\underline{F}_0)/(1-p)$ in the good state. The bad state repays without a fire-sale, and the follow-up loan is risk-free by A2, since $\overline{F}_0 < F_0^{\text{nc}}$. Banks break even, and the firm recovers the total NPV of the project. Next, we show how recharge can replicate the state-contingent contract.

3.3 Lock-in and commitment

With recharge, the incumbent keeps the most senior claim on $\zeta_0 I_0$, even if L_0 is repaid. The firm and the incumbent can agree to issue new senior debt secured by the claim at any time, distributing cash to shareholders.

Lemma 1 (Recharge dilutes the outside lender) *Suppose the firm borrows the follow-up loan $L_1^{*,nc}$ from an outside lender. With recharge, the firm raises $\gamma\zeta_0 I_0$ from the incumbent whenever its residual claim is worth less than the liquidation value of the initial assets, $W(F_0) < \gamma\zeta_0 I_0$. The recharged loan is senior to the outsider's junior lien and risk-free for the incumbent.*

By recharging, the firm raises $\gamma\zeta_0 I_0$ in cash. For every unit of face value raised in debt, the firm reduces its residual claim W. The firm pushes itself into default in the low final state when the recharge raises more than the residual claim it gives up, and the loss falls on the outsider. The outsider anticipates the recharge and prices its loan as risky, because it cannot protect itself by contract.[9] The threat depends on the excess collateral E_0, the liquidation value of the rechargeable claim less the debt it still secures at $t = 1$. With one-period debt, $E_0 = \gamma\zeta_0 I_0$.

Definition 2 (Lock-in) *The firm is locked in when the excess collateral exceeds its residual claim in the low final state, $E_0 > W(F_0)$.*

Let $S_1 = q(1-\gamma)(\zeta_0 I_0 + \zeta_1 I_1)$ denote the expected fire-sale loss that financing with the incumbent avoids.

Proposition 1 (Recharge gives the incumbent market power) *Let the firm be locked in, $0 \leq W < \gamma\zeta_0 I_0$. It borrows the follow-up loan from the incumbent, which avoids default in the low final state. The incumbent uses its market power and charges a markup $\bar{\lambda} S_1$ over break-even, with $\bar{\lambda} = \min(\lambda, W/S_1)$. L_1^{inc} pays $\ell_1 = I_1 - \overline{X}_1 + F_0$ and repays $F_1 = \ell_1 + \bar{\lambda} S_1$.*

[9] A negative pledge covenant does not bind the incumbent (Ayotte & Bolton, 2011) and only gives the outsider an acceleration threat against the firm, which needs to be incentive compatible (Donaldson, Gromb, & Piacentino, 2025). Accelerating would recover only $\gamma\zeta_1 I_1$, less than the expected repayment from continuing, whatever face value F_1 the outsider charged.

Taking out the loan with the incumbent removes the recharge incentive. Since only the incumbent can use the recharge, it bargains bilaterally with the firm over the avoided fire-sale loss. A markup above $W(F_0)$ would push the low final state into default and remove that surplus, so the incumbent's share is capped, $\bar{\lambda} \leq \lambda$.

Proposition 2 (Recharge cross-subsidises) *There is a set of equilibrium contracts* $(L_0^{*,re}, L_1^{*,re})$ *with recharge that implements the first-best if and only if, at* $F_0 = \underline{F}_0$*, (i) the firm is locked in,* $W(\underline{F}_0) < \gamma\zeta_0 I_0$*, and (ii) the markup covers the repayment gap of the state-contingent contract,* $\bar{\lambda} S_1 \geq \overline{F}_0 - \underline{F}_0$*. In it,* $L_0^{*,re}$ *pays* $\ell_0 = \underline{X}_1 + \zeta_0 I_0 + (1-p)\bar{\lambda} S_1 \geq I_0$*, repays* $F_0 = \underline{X}_1 + \zeta_0 I_0$*, and secures the loan with a senior rechargeable claim on* $\zeta_0 I_0$*. The firm pays out* $\ell_0 - I_0$ *to shareholders at* $t = 0$*.* $L_1^{*,re} = L_1^{inc}$ *from Proposition 1.*

The initial repayment equals the pledgeable output of the bad state, so the bad state repays without a fire-sale, raising surplus by $p(1-\gamma)\zeta_0 I_0$. The contract replicates the state-contingent benchmark, with the markup covering $\overline{F}_0 - \underline{F}_0$ in the good state. Any expected markup above that is passed on as a subsidy through a larger loan rather than a lower face value.[10] By committing to the incumbent, the firm pledges future growth opportunities to the initial contract. Even if the firm could contract around recharge, it would not gain from doing so.

Under A2, non-contingent debt finances every project, so recharge raises firm value but not investment. To show that it can also raise investment, suppose now that A2 fails, $W(F_0^{\text{nc}}) < 0$. The firm then defaults on the non-contingent follow-up loan in the low final state, and the two defaults reduce total surplus by $p(1-\gamma)\zeta_0 I_0 + (1-p)S_1$. Since banks break even, the firm bears this loss, and without recharge no bank finances both investments if their NPV is below it. Under recharge, the initial face value is $\underline{F}_0 < F_0^{\text{nc}}$, so the firm stays solvent in the low final state, the recharge threat remains, and the contracts of Proposition 2 are unchanged.[11] Recharge thus finances some projects that non-contingent debt cannot.

[10] A lower face value raises W. Once W exceeds $\gamma\zeta_0 I_0$, the incumbent loses its market power (Lemma 1).

[11] Since the firm's equity is zero in the bad and the low final state, an NPV below the loss means that the high final cash flow cannot repay the non-contingent follow-up loan, $(1-q)(\overline{X}_2 - \underline{X}_2) < S_1 - W(F_0^{\text{nc}})$. It must still repay the outsider's loan and the recharged loan in Lemma 1, $(1-q)(\overline{X}_2 - \underline{X}_2) \geq S_1 + \gamma\zeta_0 I_0 - W(\underline{F}_0)$. Together with (i) and (ii), the two require $\overline{F}_0 - \underline{F}_0 < \gamma\zeta_0 I_0 < F_0^{\text{nc}} - \underline{F}_0$.

The equilibrium contract $L_0^{*,\text{re}}$ is not unique. The conditions of Proposition 2 can hold for other $\hat{F}_0 < \underline{F}_0$ with $\ell_0 = I_0$, for example. Equally, L_1^{inc} need not be secured by the rechargeable claim. Recharge needs the incumbent's consent, and the incumbent prices any later recharged loan to cover the dilution of its own follow-up loan. Unlike the outsider in Lemma 1, it therefore cannot be diluted, and the security of L_1^{inc} is indeterminate.

3.4 Amortisation and excess collateral

To map the model to the data and to relax the assumption that the claim survives repayment, we let the initial loan mature in the final period with an amortisation payment D at $t = 1$. The incumbent can then recharge only $E_0 = \gamma\zeta_0 I_0 - (F_0 - D)$ without risk. Amortisation raises E_0 one for one but leaves W unchanged, since the amortised cash is re-borrowed in the follow-up loan. Full repayment, $D = F_0$, is the one-period case and creates the strongest threat, but it also lets the firm demand the claim's cancellation (section 2). With $D < F_0$, the claim still secures $F_0 - D$, and the firm needs to prepay it to cancel the claim and leave the incumbent. Prepayment penalties and the cost of registering a new claim, together κ, make leaving the incumbent costly. We assume that $\kappa \geq S_1$, so that diluting an outsider (Lemma 1) remains the firm's best outside offer. Since condition (i) is strict, some $D < F_0$ locks the firm in whenever full repayment would.

Corollary 1 (Who locks in) *With two-period debt, the firm amortises the initial loan enough to activate the recharge threat if conditions (i) and (ii) of Proposition 2 hold. Otherwise, amortisation does not change firm value, and the firm can set $D = 0$, avoiding recharge altogether. The gain from lock-in over $D = 0$ weakly increases in (1) tangible initial assets ζ_0, as long as the initial loan is risky (A1), and (2) the risk of the follow-up project, q.*

Tangible initial assets raise both the liquidation value of the rechargeable claim, strengthening the recharge threat, and the markup through the liquidation loss, strengthening the cross-subsidy. A riskier follow-up project raises the markup and leaves the dilution threat unchanged. Follow-up tangibles raise the markup but weaken the threat, so their effect is ambiguous.

3.5 Predictions

A loan's interest rate is its face value per euro raised, $r_0 = F_0/\ell_0 - 1$ for the initial and $r_1 = F_1/\ell_1 - 1$ for the follow-up loan. In the data, L_0 is a loan secured by real estate new to the firm-bank relationship, L_1^{inc} any later loan from the same bank without new real estate, and I_1 a first public procurement award. Since the security of L_1^{inc} is indeterminate, it can be secured by real estate already pledged to the bank, by other collateral, or not at all. In a model with more periods, the firm and the incumbent might leave the excess unused to keep the recharge threat for later investments, which would favour an unsecured L_1^{inc}. We treat the follow-up assets $\zeta_1 I_1$ as collateral other than real estate. E_0 and $E_0/(\gamma\zeta_0 I_0)$ correspond to the excess collateral E_{ibt} and the lock-in share LS_{ibt} in (4). Each prediction has a counterpart without recharge.

Prediction 1 (Ex-ante subsidy) *Under recharge, a loan secured on assets new to the lending relationship carries a lower rate r_0 than a loan with the same recovery value secured on assets already under the lender's claim, by the subsidy at origination (Proposition 2) plus the markup on a follow-up loan (Proposition 1). The subsidy attaches to the new claim, whether or not the loan starts the relationship. Without recharge the two loans are priced the same.*

Both loans are risk-free in the model, so $r_1 - r_0 = \bar{\lambda}S_1/\ell_1 + (1-p)\bar{\lambda}S_1/\ell_0$. A re-pledge under the same claim adds recovery but not commitment, so it carries no subsidy. We compare L_0 with the follow-up loans secured by re-pledged real estate rather than with all follow-up loans because both are secured by real estate, so the comparison holds the type of collateral fixed.

Prediction 2 (Markup on a follow-up investment) *Under recharge, a locked-in firm borrows the follow-up loan from the incumbent (Proposition 1) at a rate r_1 above break-even by $\bar{\lambda}S_1/\ell_1$. The markup does not depend on how the follow-up loan is secured. A firm that is not locked in borrows at break-even from any bank.*

Lock-in is a threshold: once $E_0 > W$, the markup $\bar{\lambda}S_1$ does not depend on E_0. With W varying across firms, the share of firms that are locked in rises with $E_0/(\gamma\zeta_0 I_0)$, so the

lock-in share measures how likely a firm is to be locked in rather than how large its markup is.

Prediction 3 (Who locks in) *Under recharge, amortising initial loans are more common among firms with more tangible assets in place and riskier follow-up investments (Corollary 1). Without recharge, amortisation does not change firm value.*

Next, we measure lock-in and test the predictions in the data.

4 Measuring recharge in the data

AnaCredit is the euro area's loan-level credit register. It is harmonised across the national central banks under a single ECB regulation allowing cross-country comparison. Credit institutions resident in the euro area and euro-area branches of foreign credit institutions report every credit agreement with a legal entity if the total commitment within the relationship reaches €25,000, including any off-balance-sheet exposures. Reported instruments include term loans, revolving and non-revolving credit lines, overdrafts, credit cards, trade receivables and leases. Reporting is monthly and starts in September 2018. We merge the credit data with Orbis and European procurement data from Tenders Electronic Daily (TED).

Any assets or rights securing these loans are reported with identifiers that are unique within the reporting bank and are linked to each loan. We can follow an asset across loans and time within a relationship, but not across banks. Banks report the type of each pledged asset, which we group into real estate, other physical assets such as machinery, financial assets, financial guarantees, trade receivables, and other assets. The value of the asset is the *protection value*. For each loan that the asset secures, banks additionally report the *protection allocated value*, the maximum amount of the protection value that they consider credit protection for that loan under their internal risk management rules.[12] The allocation

[12]"The protection allocated value is the maximum amount of the protection value that can be considered as credit protection for the instrument. The amount of the existing third-party priority claims against the protection or priority claims against the protection of other instruments relating to the same or another observed agent within the scope of the reporting agent is excluded when deriving the protection allocated value." "The allocated protection value takes the notional protection value as a starting point and considers additional factors affecting maximum amount of the protection value" such as the mortgage inscription amount and "the market conditions at which the protection item could be liquidated." AnaCredit Reporting Manual, Part II.

nets out priority claims of other lenders on the asset and the claims of the bank's other loans on it, so the allocations of one asset across a bank's loans should not exceed its value net of other lenders' claims. The nominal amount registered against the asset in the public register for mortgages and land charges is not reported.

Throughout we define collateral as the protection allocated value of real estate, physical assets, financial assets, trade receivables, and other assets.[13] We define a loan as secured if a collateral asset is linked to it and secured by real estate if one of those assets is real estate. Secured debt is the outstanding balance of secured loans. The collateral ratio of a loan is its collateral over its outstanding balance, the inverse of loan-to-value (LTV).

We collect the procurement data from TED, the EU publication platform for EU-wide tenders. The publication of procurement contracts and their results is governed by EU laws for contract awards above certain thresholds and by national rules below.[14] Contracts above the threshold generally follow either the open or the restricted procedure. A contract is published EU-wide on TED, including documents and qualifying and selection criteria. We amend TED with national registers where available that include tenders below the EU threshold.[15] They allow us to more accurately determine when a firm won its first procurement award.

4.1 Secured debt in the euro area

We show in six facts that secured debt is important in the euro area and that recharge shows up in the raw data, and build our measure of lock-in on them. Our firm panel aggregates AnaCredit to 3.7 million firms across 20 countries from September 2018 to June 2026, with 213 million firm-months with positive debt. Table 2 reports the seven countries we study and the euro area.

[13] We exclude financial guarantees in contrast to Degryse et al. (2026). A financial guarantee is a promise by an entity other than the borrower to assume the debt in the event of non-payment. It is not a claim on an asset, has no rank in liquidation, and its value depends on the guarantor's solvency.

[14] Thresholds apply according to the type of contract and buyer. Services and supplies for central government authorities (€143,000), for sub-central government authorities (€221,000), for utilities (€443,000), and for public works (€5,538,000) for 2024-2025.

[15] AT: Kerndaten, ES: PLACSP, FR: BOAMP, IT: ANAC.

Fact 1: Half of debt is secured, mostly by real estate. Banks report claims on assets worth €1.77 for each euro of secured debt, a collateral ratio of 1.77. Pledged assets are worth 81% of all outstanding corporate debt, secured and unsecured (see also Degryse et al., 2026), and two thirds of them are real estate. Over-collateralisation is not specific to recharge. The collateral ratio is 1.92 in France and Italy against 1.62 in the recharge countries, and in Austria and Germany the allocated value is close to the secured debt. This measure reflects the amount of collateral allocated to loans, not the size of the registered claim, which we address when measuring lock-in.

Fact 2: Firms in recharge countries pledge real estate twice as often. Real estate accounts for 80% of collateral in recharge compared to 55% in non-recharge countries, and 35% of firm-months with debt include debt secured by real estate against 16%. The gap holds in every size class (Table 11) and outside the real estate sector, where the shares are 30% and 13%, and is 17 percentage points within industry and size class (Table C.1). In recharge countries, small firms are more likely to pledge real estate than large firms, and the difference between recharge and non-recharge decreases in firm size.

4.2 Recharge in the data

Fact 3: Collateral is released more slowly than loans are repaid. Firms retain excess claims on collateral as loans amortise. Figure 2a shows that the collateral to debt ratio increases by nearly 70% over the first five years of a loan's life. These excess claims accumulate in all countries, not just recharge countries. The recharge mechanism predicts that the excess claims can be used to secure new debt in recharge countries. In France and Italy the excess claims secure nothing beyond the outstanding balance of the original loan, which makes them a placebo with the same excess and no right to use it.

Fact 4: Banks reallocate collateral from old to new loans secured by the same asset. Figure 2b shows what happens with the allocation of an existing loan when a new loan is secured with the same asset at the same bank. In recharge countries, the allocation on the existing loan falls by 7.8% in the origination month of the new loan. The bank moves

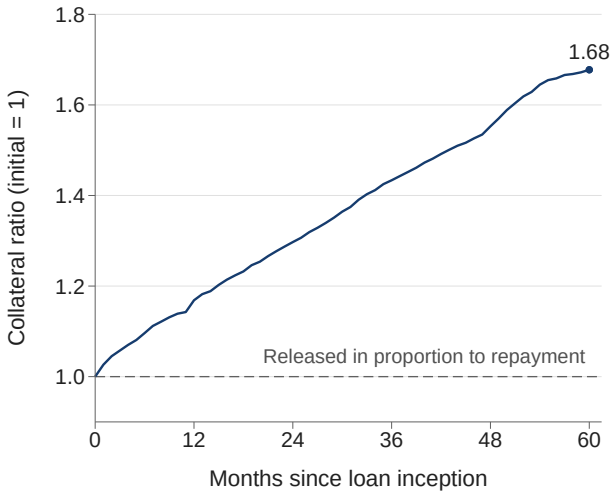
Table 2: Collateral coverage of euro-area firm credit

	Recharge						No recharge			
	AT	BE	DE	ES	NL	Total	FR	IT	Total	Euro area
Share of debt secured (%)										
Aggregate	65	65	63	26	42	53	50	32	41	50
Firm mean	65	62	57	28	82	48	49	25	38	44
Firm median	99	97	82	0	100	41	50	0	4	24
Firm s.d.	44	45	46	41	37	46	44	39	43	46
Collateral / secured debt										
Aggregate	0.89	1.31	1.07	2.69	3.05	1.62	1.98	1.87	1.92	1.77
Firm median	0.93	0.97	0.84	2.18	2.74	1.00	1.00	1.58	1.04	1.02
Firm p10	0.26	0.00	0.00	0.91	0.00	0.10	0.00	0.17	0.00	0.00
Firm p90	1.37	2.64	1.71	7.21	14.19	4.51	4.16	5.27	4.58	4.50
Collateral / total debt										
Aggregate	0.58	0.85	0.67	0.70	1.27	0.73	0.99	0.61	0.80	0.81
Real estate share of collateral (%)										
Aggregate	91	70	85	80	65	80	42	76	55	67
Firm mean	76	61	60	75	52	65	21	56	35	52
Share of debt in relationships with collateral (%)										
Aggregate	69	57	60	33	43	53	43	38	40	50
Firm mean	67	57	53	33	75	48	38	27	33	42
Share of debt in relationships with real estate (%)										
Aggregate	62	43	49	24	31	43	19	23	21	35
Firm mean	54	38	33	26	52	34	11	17	14	25
Share of euro-area debt (%)										
Debt	6.7	5.1	25.3	13.3	4.2	54.7	16.3	16.8	33.1	100.0
RE-secured	11.4	6.9	37.6	7.6	3.7	67.1	8.4	10.0	18.4	100.0
Firms (thousands) and firm-months (millions)										
Firms	114	327	410	605	101	1,558	782	703	1,484	3,680
Firm-months	9.4	28.9	37.7	54.0	8.6	138.5	69.2	61.4	130.6	324.8
Firm-months with debt (%)										
Share of all	74	65	75	67	57	68	68	72	70	67
Secured	68	66	60	40	70	55	63	35	49	53
RE-secured	52	39	34	30	43	35	13	20	16	27

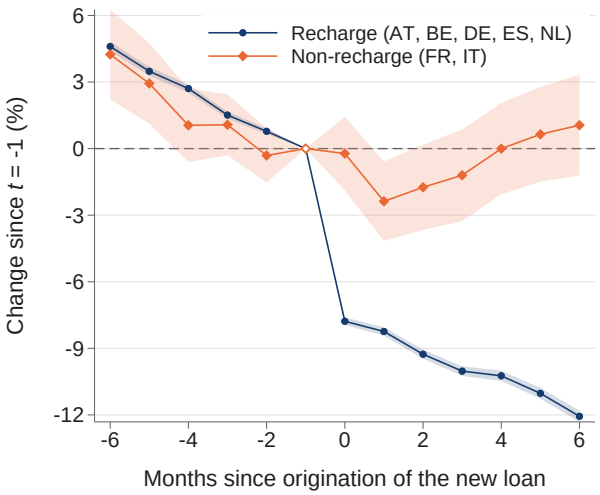
Notes: This table documents the use of collateral in euro-area firm credit, by country and recharge group. Euro area pools all countries in the panel. Aggregate rows are ratios of country-month sums from January 2019, averaged over months weighted by debt, or by collateral for the collateral shares. Firm rows use the firm-months with a positive denominator. The relationship shares count all debt held by lenders with collateral other than guarantees, or with real estate, allocated to the firm. The shares of euro-area debt are each country's share of the month's debt, or of its debt secured by real estate, in the panel countries, averaged over months. In the last block, the first row is a share of all firm-months and the secured rows are shares of firm-months with debt.

Figure 2: Collateral release and reallocation

(a) Collateral is released more slowly than loans are repaid



(b) Collateral is reallocated when a new loan is secured by re-pledged real estate



Notes: This figure shows that banks release collateral more slowly than loans are repaid and, in recharge countries, shift it to new loans secured by the same property. Panel (a): Mean across loans of the collateral ratio, real estate allocated over outstanding balance, relative to its value in the loan's first month reported with real estate collateral, at most six months after inception. Term loans secured by real estate, relative ratio capped at 10. Loans whose balance later exceeds 110% of the first reported balance are excluded. Panel (b): Mean percent change since $t = -1$ in the real estate allocated to an existing term loan around the origination ($t = 0$) of a new loan from the same bank secured by one of the existing loan's real estate items. Shaded areas are 95% confidence intervals of the mean.

excess collateral from the amortised loan to the new one. In non-recharge countries, a new loan on the same property needs its own registration, which ranks behind the existing claim, so the existing loan's allocation should not change. It dips briefly after the origination and returns to its previous level within four months. Figure C.1 in the appendix compares this event to new loans that do not share the asset. When the new loan comes from the same bank with other collateral, from another existing lender, or from a new lender, the allocation on the existing loan falls by at most 1.4% in the origination month (Figure C.1a). The existing loan's collateral ratio falls by 5% (Figure C.1b). The total allocation of the existing loan's real estate across all loans it secures, including the new one, rises by 23% (Figure C.1c), twice as much as its protection value (Figure C.1d), reflecting slack in the total registered claim, which we discuss in subsection 4.4.

Fact 5: In recharge countries, one property secures many loans. If an existing claim can secure new loans at its original rank, assets should secure more loans than where each loan requires a separate costly registration. Table 3 confirms this pattern. In Austria, Belgium, Germany, and the Netherlands, where real estate claims are freely rechargeable, 49 to 86% of pledged properties secure more than one loan, against 11% in France and 25% in Italy. Spain resembles the non-recharge group at 17%. Its rechargeable mortgage only allows the top-up of an existing loan agreement, not securing additional loans, which a count of loans per asset cannot capture.

Fact 6: Firms with pledged real estate borrow less often from new banks. Conditional on taking new credit from a bank, the probability that a firm without collateral has not borrowed from that bank before in AnaCredit is 16.3%. Within country, industry, size class and month, this probability is 2.3 percentage points lower for firms with pledged real estate (Table 4, column 3). The gap is 1.4 points in France and Italy and 1.8 points larger in recharge countries, where the incumbent can recharge its claim (column 4).

These facts show that secured debt is important in the euro area, that recharge is observable in the data, and that firms with pledged real estate are less likely to borrow from new banks, especially in recharge countries. The recharge gap in real estate pledging is

Table 3: Re-use of real estate collateral by country

	Loans per asset		Share (%)	
	Mean	Median	Re-used	N assets
Recharge				
Austria (maximum-amount mortgage)	2.43	1	48.7	463,647
Belgium (maximum-amount mortgage)	13.63	4	74.2	544,046
Germany (land charge)	8.42	2	64.2	1,322,560
Netherlands (maximum-amount mortgage)	6.64	4	85.6	1,163,720
Spain (same-loan recharge)	2.19	1	17.2	1,388,744
Non-recharge				
France	1.86	1	11.3	421,179
Italy	2.45	1	24.9	1,988,582

Notes: This table reports re-use patterns of real estate collateral. The unit of observation is a real estate protection item pledged by a firm to a reporting bank, over the item's observed life in the panel. Loans per asset is the mean and median number of distinct loans the item is ever linked to. Share re-used is the share of items linked to two or more loans. N assets is the number of items.

Table 4: Firms with pledged real estate take fewer new loans from new banks

	(1)	(2)	(3)	(4)
Real estate pledged	-0.58***	0.93***	-2.29***	-1.37***
	(0.06)	(0.11)	(0.07)	(0.11)
Real estate pledged × recharge		-1.80***		-1.75***
		(0.13)		(0.14)
Recharge		-0.88***		
		(0.07)		
Constant	16.28***	16.67***	16.77***	16.82***
	(0.03)	(0.05)	(0.03)	(0.03)
Country × industry × size × month FE	No	No	Yes	Yes
Observations	7,751,415	7,751,415	7,732,059	7,732,059
Firms	1,444,189	1,444,189	1,440,429	1,440,429

Notes: This table shows that firms with pledged real estate are less likely to take a new loan from a new bank, in particular in recharge countries. We estimate

$$y_{ibt} = \alpha + \beta\, RE_{i,t-1} + \delta\, RE_{i,t-1} \times R_i + \theta R_i + \varepsilon_{ibt},$$

where y_{ibt} indicates that the relationship between firm i and bank b is new in month t. Observations are firm-bank-months from January 2021 where new credit is originated. A bank is new if the firm has signed no earlier contract with it since September 2018. Coefficients are in percentage points. $RE_{i,t-1}$ indicates that the firm has pledged real estate with one of its banks in month $t-1$, and R_i that the firm is in a recharge country. All columns also control for other collateral, in columns (2) and (4) separately by country group. The coefficients are firm-weighted. Standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

largest among small firms, which have less access to external finance (Ferrando et al., 2017). Next, we compare loans that register new claims with loans that recharge existing ones, and measure the model's lock-in.

4.3 Loans that register initial claims

In our empirical analysis we differentiate between loans that are secured by real estate that has not been previously observed within the firm-bank relationship and those that are secured by previously pledged real estate. When real estate is pledged initially to a bank the collateral claim needs to be formally registered. Any follow-up loan secured by the same asset is taken out under a threat of recharge in Austria, Belgium, Germany, the Netherlands, and, through a top-up, Spain. To compare the interest rates between these loans, we need to account for the fact that their terms differ, as Table 5 shows. Loans secured by newly pledged real estate are relatively larger, have longer maturity, and are less likely to finance working capital. Those differences reduce with loan term fixed effects at the country, month, instrument type, rate type, and maturity bin level. In the empirical analysis, we will compare the interest rates of the loans within these fixed effects.

4.4 Measuring lock-in

The model's recharge threat is credible if a bank holds a claim on the firm's excess real estate collateral $E_0 = \gamma\zeta_0 I_0 - (F_0 - D)$, the liquidation value of the incumbent's claim less the debt still outstanding. Neither the total claim nor the liquidation rate γ is reported. Since the allocated value, by definition, starts from the value of the asset and applies the inscription amount of the claim and the conditions under which the asset could be liquidated, we treat it as the liquidation value, $C_0 = \gamma\zeta_0 I_0$.

We estimate the bank's registered total claim on the asset from the allocated value. The sum of the allocated values across all loans an asset secures, $C_{at} = \sum_l C_{lat}$, is the total claim the bank draws on for its current loans. Once a loan is repaid, its allocation drops out of the sum while the claim persists. We estimate the registered amount of the claim as the most the bank has drawn on the claim so far, the running maximum $C_{at}^{\max} = \max_{s \le t} C_{as}$.

Table 5: Loans secured by new and re-pledged real estate

	Recharge			Non-recharge		
	Previous RE	New RE	Within cell	Previous RE	New RE	Within cell
Log commitment	11.520	12.500	0.326***	12.848	12.610	-0.101***
			(0.012)			(0.030)
Commitment / total assets	0.087	0.296	0.093***	0.169	0.259	0.077***
			(0.002)			(0.005)
Rate (bp)	392.3	401.6	4.0***	436.9	423.7	-13.6***
			(1.3)			(3.1)
Spread (bp)	277.8	198.4	-43.0***	236.3	222.6	-15.5***
			(4.4)			(2.9)
Maturity (months)	38.1	120.5	7.5***	89.4	140.2	2.2**
			(0.3)			(1.1)
Construction	0.051	0.192	0.040***	0.485	0.416	-0.014
			(0.002)			(0.009)
Working capital	0.168	0.112	0.004**	0.036	0.024	-0.009***
			(0.002)			(0.001)
Other purpose	0.781	0.697	-0.044***	0.479	0.560	0.023**
			(0.003)			(0.009)
Fixed rate	0.580	0.620	–	0.321	0.443	–
Coverage	0.826	1.199	-0.067***	1.718	2.058	0.039
			(0.006)			(0.025)
Relationship length (months)	53.0	26.7	-16.9***	32.2	27.4	-3.0***
			(0.3)			(0.5)
PD	0.0234	0.0220	-0.0007	0.0430	0.0286	-0.0073***
			(0.0004)			(0.0012)
Large firm	0.149	0.079	-0.015*	0.064	0.039	-0.015***
			(0.008)			(0.004)
Loans	767,601	150,221		25,672	51,731	

Notes: This table compares the terms and borrowers of loans secured by new and by re-pledged real estate. Means of real-estate-secured loans under the sample restrictions of Equation 5. New RE: at least one real estate item is pledged to the firm-bank relationship for the first time; Previous RE: all items were pledged before. Commitment over total assets and the spread (variable-rate loans) are winsorised at the 1st and 99th percentiles by country. Coverage is allocated protection over commitment, capped at 5. Relationship length is zero for a loan that starts a relationship. PD is the bank-reported 12-month default probability. Within cell is the difference between new and previous RE with the loan-term cell of Equation 5 absorbed (country × month × instrument type × rate type × maturity bin); fixed rate has none, as the rate type is part of the cell. Standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Maximum-amount mortgages and land charges are usually registered above the initial debt, so the running maximum underestimates the claim and biases the lock-in downward. For the Spanish rechargeable mortgage, which is tied to the loan, the running maximum is the allocation at origination.

We do not use the current allocation to estimate the excess collateral. Banks release allocations more slowly than loans amortise (Fact 3) and reallocate them when originating new loans secured by the same asset (Fact 4). Additionally, the current allocation is endogenous to firm risk, as a bank that privately reassesses a firm may demand more collateral, which would lower the measured excess exactly when the rate rises. We instead subtract the outstanding balance from the claim. A euro of outstanding debt absorbs a euro of the liquidation value of the claim.

Let $\mathcal{L}_{ibt}$ be the loans of firm i at bank b outstanding in month t that are secured by real estate, and $\mathcal{A}_{ibt}$ the real estate assets securing them. The total claim and the excess collateral of a relationship are

$$K_{ibt} = \sum_{a \in \mathcal{A}_{ibt}} C_{at}^{\max}, \tag{2}$$

$$E_{ibt} = K_{ibt} - \sum_{l \in \mathcal{L}_{ibt}} L_{lt}, \tag{3}$$

where $C_{at}^{\max}$ is computed on the three-month median of C_{at} and capped at the protection value of the asset.[16] For revolving instruments, the current allocation C_{lt} is used for both sums. The firm can draw on a revolving line at will, using up the capacity of the collateral, so we net out any headroom that the bank allocates to it. For non-revolving credit lines, L_{lt} is the drawn plus the undrawn amount, so only repayments, which cannot be redrawn without agreement, become excess collateral. The lock-in share is the excess over the claim, floored at zero,

$$LS_{ibt} = \left[\frac{E_{ibt}}{K_{ibt}}\right]^{+}. \tag{4}$$

[16]The median guards the running maximum against single-month reporting spikes. Allocations of one asset should not exceed its protection value, so the cap binds only on reporting errors.

It is undefined for relationships without real estate collateral, $K_{ibt} = 0$. The firm-level claim, excess and lock-in share are defined identically with the sums running over all of firm i's banks. In the model, E_{ibt} is the empirical counterpart of the excess collateral E_0, and LS_{ibt} of $E_0/(\gamma\zeta_0 I_0)$, the share of the incumbent's claim it can re-lend without taking risk.

The measure reflects recharge: a top-up raises the balance of an existing loan, and a new loan secured by the same asset absorbs the allocation the bank shifts onto it (Fact 4). Figure 3 shows the distribution of the lock-in share LS_{ibt} for both recharge and non-recharge countries. The share is zero for 25.4% and 9.4%, respectively, of the firm-months for which it is defined. The lock-in share is defined for any firm that borrows with real estate. We use the variation in the lock-in share in non-recharge countries as the counterfactual for the effect of excess collateral on firms' financing conditions.

5 The discount on newly pledged real estate

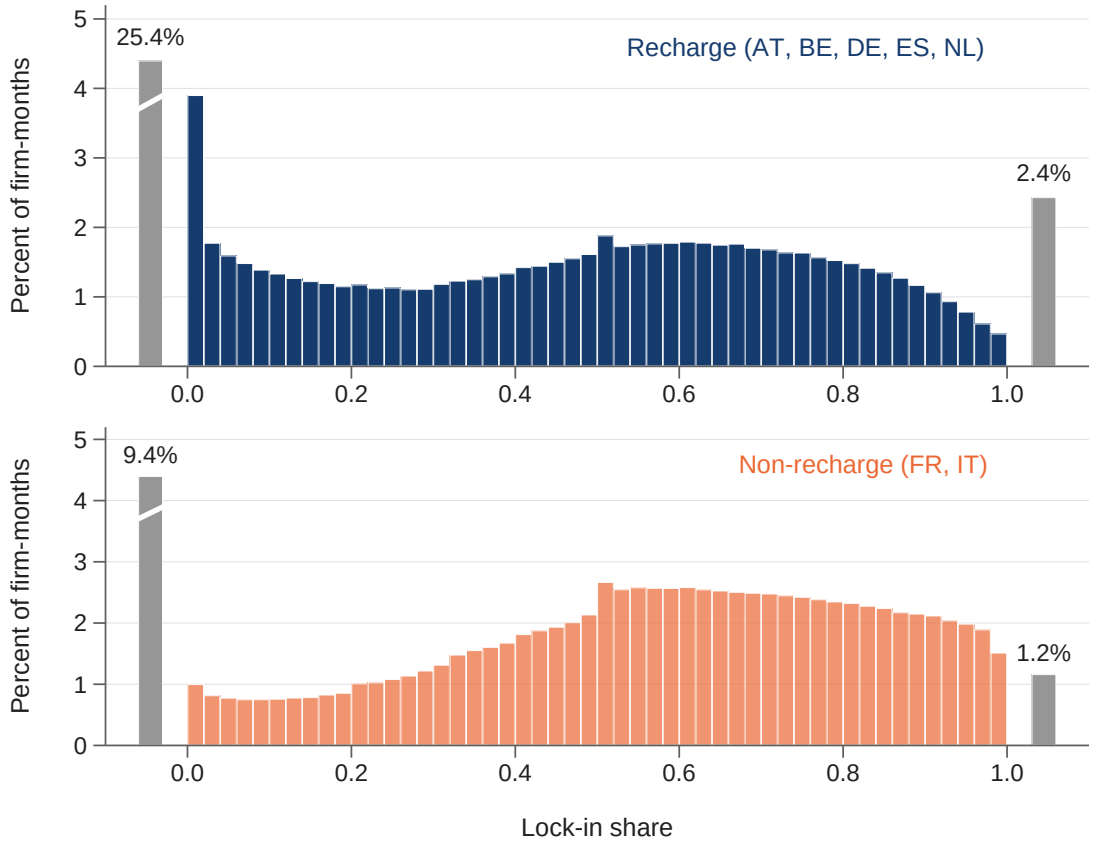
The next two sections test the model's first two predictions: (1) a loan that initially registers a claim on real estate is subsidised by the markup on follow-up loans secured by the re-pledged asset, and (2) the incumbent bank has market power over firms locked in by recharge and charges a markup on follow-up loans. In France and Italy, excess collateral cannot be recharged, so neither prediction should hold there.

5.1 Baseline specification

To test the first prediction, ideally, we would like to observe a firm's complete choice set, including loans secured by new and re-pledged real estate of comparable asset quality at otherwise identical loan terms, with the same bank at the same time. However, we only observe originated loans and need to account for endogenous loan choice.

We use a saturated regression to reduce selection and isolate the recharge pricing channel. Our specification compares loans secured by re-pledged real estate with loans secured by newly pledged real estate within the same firm-bank relationship at different points in time. To account for any supply-side effects that drive loan choice across time, we use bank $\times$ month fixed effects. On the demand side, we account for time-varying firm risk with bank-

Figure 3: Distribution of the lock-in share



Notes: This figure plots the distribution of the lock-in share by recharge group. Firm-level lock-in share (4), with the claim and the debt summed over all of the firm's banks. The unit of observation is a firm-month with real estate collateral up to June 2026, in the recharge countries (top panel, 35.2 million) and the non-recharge countries (bottom panel, 14.9 million). Colored bars are bins of width 0.02 for shares strictly between zero and one; gray bars are firm-months with a share of exactly zero (truncated) or exactly one. Bars are percentages of the panel's firm-months.

reported default probabilities. We account for differences in loan terms with loan-term fixed effects (subsection 4.3).

We run the following main specification,

$$r_{libt} = \beta_1^g NewRE_l + \Gamma_k X_l + \alpha_{\text{term}(l)} + \alpha_{bt} + \alpha_{ib} + \varepsilon_{libt}, \tag{5}$$

with loans l of firm i, originated by bank b in month t, and $g \in \{R, N\}$ the recharge group of the firm's country k. The outcome r_{libt} is the annualised agreed rate for fixed- and mixed-rate loans, and the spread over the reference rate for variable-rate loans at origination. $NewRE_l$ indicates that the loan is secured by real estate and that at least one of these items is pledged by the firm to the bank for the first time. The reference loan is secured by re-pledged real estate in an existing relationship. X_l contains indicators for guarantees, financial, other physical and other collateral that are pledged in addition to real estate, the loan's collateral coverage at origination, relationship length bins of 1 to 12, 13 to 36 and more than 36 months, the number of the firm's bank relationships, and a quadratic in the firm's average probability of default across its reporting lenders. All controls in X_l are estimated by country. $\alpha_{\text{term}(l)}$ are loan-term fixed effects for country $\times$ instrument type $\times$ interest rate type $\times$ maturity bin $\times$ origination month. We add bank $\times$ month α_{bt} and firm $\times$ bank α_{ib} fixed effects sequentially. Standard errors are clustered by firm and bank.

The sample is restricted to credit lines and term loans, loans issued in 2022 and later, loans whose purpose is not to purchase real estate, and non-renegotiated loans of solvent firms. Loans secured by real estate that are renegotiated are by definition re-pledged. Credit lines and term loans make up 90% of loan observations secured by real estate and 94% of their total amount. We remove the Covid period to reduce contamination from Covid guarantee schemes. The three-year period before the estimation sample makes the new and existing classification of assets and relationships more accurate.

Since we do not observe loan break-even rates, we cannot estimate the subsidy $(1-p)\bar{\lambda}S_1/\ell_0$ and the markup $\bar{\lambda}S_1/\ell_1$ separately. Under recharge, the coefficient estimates the sum of the subsidy and the markup, $\beta_1^R = -\left((1-p)\bar{\lambda}S_1/\ell_0 + \bar{\lambda}S_1/\ell_1\right)$ (Prediction 1). The prediction is that $\beta_1^R < 0$ in recharge and $\beta_1^N = 0$ in non-recharge countries.

Table 6 presents results for the baseline specification (Equation 5). We find that loans secured by real estate that is pledged for the first time in a relationship have 14 basis points lower interest rates and spreads than loans secured by re-pledged real estate, in recharge countries. The discount is 4 to 5% of the average rate and spread on loans secured by re-pledged real estate there (392 and 278 basis points, Table 5). In non-recharge countries, the difference between loans secured by newly and re-pledged real estate is indistinguishable from zero. The recharge coefficient is statistically different from the placebo. These three results support our alternative hypothesis that recharge is priced.

Recharge is assigned at the country level, which reduces our effective sample to seven. We therefore estimate β_1 by country in Table C.2. Four of the five recharge countries have negative coefficients; Austria's is positive, 4.8 (2.2) basis points. The regression's implicit country weights put 88% of the recharge weight on Belgium. If we instead weight each country estimate by its share of real estate relationships or debt, the recharge coefficient is -10.6 and -6.5 basis points and remains significant, while the placebo stays close to zero (Table C.3). The difference from the placebo keeps its sign at -7.8 (5.1) and -4.3 (4.2) basis points, but is not significant. Additionally, we can test how much the estimated difference is specific to our grouping of countries into recharge and non-recharge. With seven countries and two in the non-recharge group, there are 21 ways to assign the non-recharge group (MacKinnon et al., 2023; Hagemann, 2025). Our assignment ranks 6th of the 21 since Austria's coefficient is positive.

5.2 Separating collateral and informational lock-in

Informational lock-in predicts a discount for any loan that starts a relationship. If the discount in Table 6 reflects a relationship subsidy, new real estate in existing relationships should carry none. Under recharge, the subsidy and markup are tied to the registered claim on an asset, not to the relationship per se. Real estate that is new to the relationship needs a newly registered claim. Banks compete for this claim and subsidise the loan with the expected markup. The subsidy should hold any time an asset is pledged for the first time in a relationship, whether the secured loan starts the relationship or adds to an existing one. A loan secured by re-pledged real estate is issued under a claim the bank already holds. It

Table 6: Interest rates on loans secured by new and re-pledged real estate

	(1)	(2)	(3)	(4)
	Panel A: Recharge			
New RE (β_1^R)	-8.8***	-10.3***	-13.1***	-14.1***
	(1.8)	(1.6)	(3.0)	(3.4)
	Panel B: Non-recharge Placebo			
New RE (β_1^N)	-13.0	-2.0	-0.9	-1.4
	(8.8)	(2.5)	(2.8)	(3.2)
$\beta_1^R - \beta_1^N$	4.2	-8.3***	-12.2***	-12.7***
	(9.0)	(3.0)	(4.1)	(4.7)
Permutation rank of $\beta_1^R - \beta_1^N$	16/21	4/21	6/21	6/21
Loan-term FE	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	No
Bank-month FE	No	No	Yes	Yes
Firm-bank FE	No	No	No	Yes
Obs.	650,246	606,178	594,556	569,471
R2	0.58	0.75	0.78	0.78

Notes: This table examines the effect of recharge laws on loan pricing. The outcome is the spread over the reference rate for variable-rate loans and the agreed rate at origination for all other loans, in basis points. New RE is an indicator if at least one real estate item is pledged to the firm-bank relationship for the first time. The sample includes all loans with real estate collateral, so the reference loan is secured by re-pledged assets. Recharge countries are Austria, Belgium, Germany, Spain, and the Netherlands. France and Italy are the non-recharge placebo. Columns (1) to (4) report the estimates of Equation 5 with increasing fixed effects. $\beta_1^R - \beta_1^N$ is the recharge minus non-recharge difference. The permutation rank is the rank of this difference among the 21 differences with each pair of the seven countries as the non-recharge group, 1 being the most negative. Loans are originated from January 2022, and real estate purchase and renegotiated loans, publicly guaranteed loans, and defaulted firms are excluded. Loan-term fixed effects are country × month × loan type (revolving credit, non-revolving credit line, term loan) × rate type (fixed, variable, mixed) × maturity bin (up to 1, 1 to 5, 5 to 10, over 10 years). Additional controls are estimated by country: a quadratic in the firm's default probability, indicators for guarantees and for financial, other physical, and other collateral, new non-RE collateral, the number of bank relationships, and coverage. Standard errors, clustered by firm and bank, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

adds recovery but not additional commitment, and its rate includes the markup if the firm is locked in.

We test this prediction by separately estimating the new real estate discount for new and existing relationships. We amend the baseline specification in Equation 5 by interacting the indicator for new real estate $NewRE_l$ with indicators for whether the loan starts the relationship or the relationship already exists. The specification is,

$$\begin{aligned} r_{libt} = \beta_1^g NewRE_l \times NewRel_l + \beta_{2,j}^g NewRE_l \times ExistRel_l^j \\ + \beta_{3,j}^g ExistRel_l^j + \Gamma_k X_l + \alpha_{\text{term}(l)} + \alpha_{bt} + \alpha_{ib} + \varepsilon_{libt}, \end{aligned} \tag{6}$$

with $NewRel_l$ indicating that the firm had no instrument with the bank in the twelve months before origination, and $ExistRel_l$ that it did. We use $ExistRel_l^j$ to separate relationship lengths, $j \in \{1\text{–}12, 13\text{–}36, > 36, pre\}$, with pre for relationships that started before AnaCredit. The bin of 1 to 12 months is the omitted category of $\beta_{3,j}^g$. Separating the relationship bins allows us to estimate the difference between new and previous real estate holding relationship length constant. The reference loan is secured by re-pledged real estate in a relationship of one to twelve months and is the base against which β_1^g is estimated. Standard errors are clustered by firm and bank. X_l contains the new and existing relationship indicators interacted with collateral types other than real estate that are new to the relationship by recharge group in addition to its definition from Equation 5.

To reject the null that informational lock-in drives the discount of new real estate in Equation 5, we need $\beta_{2,j}^R < 0$ in recharge countries. The difference $\beta_1^g - \beta_{2,1-12}^g$ captures the subsidy and markup of informational lock-in that relationships secured by real estate create; informational lock-in predicts that it is negative.

AnaCredit's time-series dimension limits the relationship length that we can confidently estimate (Kosekova et al., 2025). We can identify relationships that existed before September 2018 only through loans still outstanding in AnaCredit's first month. The length can therefore not be inferred except by the maturity of outstanding loans, which biases against short-maturity relationships. Since we begin our sample in January 2022, we can confidently classify relationships below 39 months, which motivates our choice of relationship bins. We

add a separate bin for relationships that started before AnaCredit.

Table 7 presents results for the relationship specification (Equation 6). Loans secured by newly pledged real estate carry 20 to 24 basis points lower rates both for new and existing relationships up to 3 years. For relationships before AnaCredit, the discount is 10 basis points. That bin carries large relationship heterogeneity and we cannot compare loans within the same relationship length. For relationships that started in our sample and are older than 36 months, the difference turns positive, at 4 basis points. The estimate is positive in Belgium and Spain, and negative in the other three countries (Table C.2). The discounts on loans secured by new real estate in new relationships and in existing relationships of 1 to 12 months are indistinguishable, supporting the hypothesis that informational lock-in is not driving the results. The recharge estimates are significantly below the non-recharge placebo except in the longest in-sample bin.

The remaining selection that our empirical design does not explicitly rule out is endogeneity in the choice to pledge new assets. The main concern is that unobserved investment opportunities generate new assets. Pledging new assets then captures the firm's positive outlook. The estimated effect would reflect differences in unobserved quality of firms. The null result in non-recharge countries alleviates this concern, as they should be subject to the same selection. Still, we test the model's second prediction, the markup on follow-up financing, in a setting where the firm's investment opportunity is observable (section 6).

6 Market power after procurement awards

This section tests the second prediction that a locked-in firm pays a markup on its follow-up financing (Prediction 2). We study firms that win public procurement contracts, whose follow-up investment every lender can observe. We first set out the design and its assumptions and show that large awards raise credit without changing its price. We then estimate the changes in the price and the quantity of debt of winners with excess collateral, in recharge and non-recharge countries. In this test, non-recharge winners with excess collateral are the counterfactual for firms' credit access if excess collateral can be freely used. Last, we show that the award levels the information between the incumbent and outside banks to rule out

Table 7: Interest rates on new real estate in new and existing relationships

	Recharge	Non-recharge placebo	Recharge − non-recharge
New RE, new relationship (β_1^g)	-23.5***	-4.9	-18.5**
	(4.6)	(7.3)	(8.6)
New − previous RE, existing relationship			
1–12 months ($\beta_{2,1-12}^g$)	-21.5***	-3.6	-17.9***
	(4.8)	(4.5)	(6.6)
13–36 months ($\beta_{2,13-36}^g$)	-19.8***	-3.1	-16.6***
	(3.8)	(4.8)	(6.1)
over 36 months, in the data ($\beta_{2,>36}^g$)	3.6**	-2.3	5.8**
	(1.6)	(2.3)	(2.8)
before AnaCredit ($\beta_{2,pre}^g$)	-9.6**	-0.2	-9.4**
	(3.8)	(2.7)	(4.6)
$\beta_1^g - \beta_{2,1-12}^g$	-2.0	-1.4	-0.6
	(3.7)	(5.5)	(6.7)
Loan-term FE		Yes	
Firm FE		No	
Bank-month FE		Yes	
Firm-bank FE		Yes	
Obs.		569,471	
R2		0.78	

Notes: This table examines whether informational lock-in can explain the new real estate discount. Outcome, sample, and country groups as in Table 6. A relationship is new if the firm has no instrument with the bank in the 12 months before origination. The reference loan for β_1^g is secured by re-pledged real estate in a relationship of 1 to 12 months. Relationships over 36 months are split into those that started in AnaCredit ($\beta_{2,>36}^g$) and those already present in its first month, September 2018, whose length is unknown ($\beta_{2,pre}^g$); as the sample starts in January 2022, every relationship before AnaCredit is older than 36 months. $\beta_{2,j}^g$ is the difference between new and re-pledged real estate within relationship-length bin j. The *Recharge* and *Non-recharge placebo* columns report estimates of Equation 6 with the fixed effects of column (4) of Table 6. The last column is the recharge minus non-recharge difference. $\beta_1^g - \beta_{2,1-12}^g$ compares new real estate in a new relationship with new real estate in a relationship of 1 to 12 months. Controls as in Table 6, with new non-RE collateral split by new and existing relationship, plus relationship-length bins and an indicator for a new relationship without new real estate. Standard errors, clustered by firm and bank, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

the alternative explanation of informational lock-in.

6.1 Design and identifying assumptions

We isolate the markup around the firm's follow-up investment I_1 for firms that compete for procurement contracts. A first award is the arrival of I_1, for which the firm raises F_1. Whether the firm is locked in when it wins depends on the real estate it pledged for its earlier financing and on how much of that debt it has repaid since. An incumbent with a credible recharge threat can charge a markup, and the larger the firm's excess collateral, the more likely the threat is credible.

Participating in and winning procurement contracts is not random. Ideally, we would use randomly allocated procurement contracts or compare close winners to runners-up as those differences are less selective. However, for countries with recharge, only data on winners for the AnaCredit time period is available. We therefore evaluate the credit response of firms around their first win.

We compare winners with excess collateral a year before the award with not-yet-winners, firms that win their first award 13 months or more later. The non-recharge countries absorb any difference that does not run through recharge and act as the counterfactual. This triple difference identifies the markup under two assumptions: (1) the timing of the award is conditionally exogenous, and (2) absent recharge, the award would change the cost of lending to winners with excess collateral by the same amount in both country groups.

We build a stacked panel for each observed first-time procurement award. For each winner, we match up to 5 not-yet-winners, defined as firms winning a tender award 13 months or more after the treated firm. Firms are matched from within the same country, 2-digit NACE industry, and of the same size category (large, medium, small, micro). We exclude firms from the treated and potential control pool that ever defaulted twelve months prior to the award cohort date.[17] We restrict the awards to open, restricted and negotiated with call procedures.[18] The effect we estimate is the average treatment effect on the treated

[17] Defaulted firms are more likely to be in the control than treatment group as qualifying criteria in procurement bidding exclude firms in bankruptcy or insolvency. Since defaulted firms are on a different path than non-defaulted firms, they would violate the average parallel trends assumption.

[18] 80% of these awards have multiple bidders and the median award has three bidders.

(ATT) for solvent firms that participate in bidding for competitive procurement awards. Each cohort c pools the treated firms and their matched controls over the event window. On the stacked panel we estimate,

$$y_{ict} = \delta_1 \text{Win}_{ic} \times \text{Post}_{ct} + \alpha_{ic} + \alpha_{kct} + \varepsilon_{ict} \tag{7}$$

with firm i, country k, award cohort c (the month of the treated firm's first award), calendar months t, and event time $\tau = t - c \in \{-12, \ldots, 6\}$. $\text{Win}_{ic} = 1$ if firm i wins its first award in month c and 0 for its matched not-yet-winners. $\text{Post}_{ct} = \mathbf{1}\{t \geq c - 6\}$. α_{ic} are firm $\times$ cohort and α_{kct} cohort $\times$ country $\times$ calendar-month fixed effects. Standard errors are clustered by firm. The outcomes y_{ict} are the amount-weighted average interest rate on outstanding debt, the bank-reported 12-month default probability, and the stocks of total, secured, unsecured, and incumbent debt, each scaled by total assets measured at event month -12, and the incumbent share. Incumbent debt is the firm's debt with its largest lender at event month -12. The incumbent share is incumbent debt scaled by total debt. The coefficients read as cumulative net flows per euro of pre-award assets. All variables are winsorised at the 1st and 99th percentiles. δ_1 is the post-award credit response of winners.

We allow for an anticipation window of six months before the award date, since we do not always observe the date of the award decision (Table C.4), and test for pre-trends in the event studies.

The credit demand shock should rise with the size of the award. We scale the award size by the firm's total assets at event month -12 and divide them into terciles. We estimate Equation 7 interacted with the size terciles,

$$y_{ict} = \delta_1 \text{Win}_{ic} \times \text{Post}_{ct} \times \text{Tercile}\left(\frac{\text{First Award}_{ic}}{\text{Assets}_{i,c-12}}\right) + \alpha_{ic} + \alpha_{kct} + \varepsilon_{ict}. \tag{8}$$

The dynamic event study replaces the post indicator for Equation 7 with a full set of event-time indicators,

$$y_{ict} = \sum_{\substack{\tau=-12 \\ \tau \neq -7}}^{6} \theta_\tau \mathbf{1}\{t - c = \tau\} \text{Win}_{ic} + \alpha_{ic} + \alpha_{kct} + \varepsilon_{ict}, \tag{9}$$

with the last month before the post window, $\tau = -7$, as the base period. The pre-award segment $\{\theta_\tau | \tau < -6\}$ is the parallel-trends placebo.

Table C.7 shows the balance between the control and treatment group. Treated firms are 7% larger than their controls and 1.0 percentage points more likely to have two or more bank relationships. Otherwise, they are statistically indistinguishable. Under our identifying assumption, treatment and control firms do not differ in their investment opportunities apart from the observable procurement award, in expectation.

6.2 Procurement awards raise credit

Table 8 presents the results of the difference-in-differences specification (Equation 7 and Equation 8). Splitting awards by relative award size confirms that larger awards lead to a larger credit response (Panel B). The largest third of awards increase total debt by 6% of pre-award levels, driven by an 8% rise in unsecured debt. There is no effect on interest rates. The middle tercile shows no effect. The lowest tercile results in a decrease of debt by 3% and an increase of interest rates by 8 basis points. A possible interpretation is that these awards are realisations below the expectation, leading to a withdrawal of unsecured credit or a cutback of initial investments. The 43% of awards without a reported size (Table C.4) have no effect. The overall effect is an increase in unsecured debt by 1.4%. Going forward, we use awards in the largest size tercile as those constitute a credit demand shock.

We assume that winners and not-yet-winners are both competing for procurement awards and winners are the firms that exogenously won in cohort month c. Winners cannot anticipate the timing of their win and do not adjust their behaviour before bidding. The difference between winners and not-yet-winners would then have evolved similarly without winning the award. The non-anticipation assumption is plausible as most procurement awards are allocated through public tender processes and winners are selected in openly accessible sealed-bid auctions. Bidders do not know how many other firms are competing (Gabriel, 2024).[19]

[19] Under the open procedure, bidders submit their technical and financial offer within 30 days. Bids are opened after the bidding window and scored on their price and potential quality criteria. Bidders do not know who else participates in the bidding. Under the restricted procedure, firms first request to participate. The authority invites a minimum of five candidates to submit their bids within 30 days in line with the open procedure.

Table 8: Credit response to a first procurement award, by award size

		Debt / assets					
	Rate (bp)	Total	Secured	Unsecured	Incumbent	Inc. share	PD
	Panel A: All winners						
Win × Post	1.37	0.11	-0.03	0.17**	0.08	-0.24	0.08
	(0.87)	(0.09)	(0.05)	(0.07)	(0.07)	(0.18)	(0.05)
	Panel B: By award size / assets						
Tercile 3 (largest)	-1.57	1.18***	0.08	1.02***	0.05	-0.30	0.14
	(1.67)	(0.19)	(0.08)	(0.16)	(0.16)	(0.31)	(0.10)
Tercile 2	1.79	0.06	0.04	0.12	0.26**	-0.49	0.07
	(1.48)	(0.15)	(0.08)	(0.12)	(0.12)	(0.31)	(0.10)
Tercile 1 (smallest)	7.77***	-0.50***	-0.08	-0.35***	0.16	0.21	0.01
	(1.36)	(0.14)	(0.07)	(0.11)	(0.10)	(0.30)	(0.09)
Unknown or zero award	-0.35	-0.05	-0.07	0.05	-0.03	-0.29	0.08
	(1.11)	(0.10)	(0.06)	(0.08)	(0.08)	(0.22)	(0.07)
Mean	297.13	19.24	6.55	12.34	15.01	74.63	3.58
Winners	30,832	34,469	34,469	34,469	29,817	30,396	28,911
Control firm-cohorts	132,365	148,394	148,394	148,394	127,903	130,738	123,762

Notes: This table examines the credit response of firms to their first public procurement award, by award size. Each cell is δ_1, the coefficient on $\text{Win}_{ic} \times \text{Post}_{ct}$, with Post_{ct} covering event months -6 to $+6$ against -12 to -7, on the seven countries pooled. Panel A pools all winners (Equation 7). Panel B splits them into terciles of award size within country, the first award's value over total assets at event month -12 (Equation 8); Unknown or zero award: no known positive award value, or no assets. Mean is the regression constant. The debt columns are over total assets at event month -12. The incumbent is the firm's largest lender at event month -12; Inc. share is its share of drawn bank debt. Winners and Control firm-cohorts count each column's sample, the same in both panels. Fixed effects: firm × cohort and cohort × country × month. The rate, the debt ratios, and PD are winsorised at the 1st and 99th percentiles. Rates in basis points, all other columns in percentage points; standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 4 shows the event study estimates of Equation 9 for the largest award tercile for recharge and non-recharge countries, and total debt over assets and interest rates, separately. In Figure 4b, debt increases from three months before the award date up to 2 percentage points for recharge countries and 1 percentage point for non-recharge countries. The anticipation is in line with the 75th percentile of the delay between the award decision and the award notice. Non-recharge countries have longer delays and an earlier response in the event study. In Figure 4a, there is no effect on the interest rate. We cannot reject that the parallel-trends assumption holds for rates overall and debt in recharge countries. There is a significant increase in the first pre-period for debt in non-recharge countries, potentially due to Italy's long reporting delays (Table C.4). We will report and test pre-trends for our main specifications going forward.

6.3 Identifying recharge market power

We use the largest terciles of awards as a credit demand shock to identify the response in the price and quantity of credit for firms with excess collateral. In non-recharge countries, firms can secure any bank's debt with it, which should improve their access to financing over those with little excess collateral. In recharge countries, the excess is subject to the recharge threat of the incumbent and therefore locks in the firm. Under our assumption that, absent recharge, the cost of lending would have evolved the same across the two groups, the difference between recharge and non-recharge measures their market power.

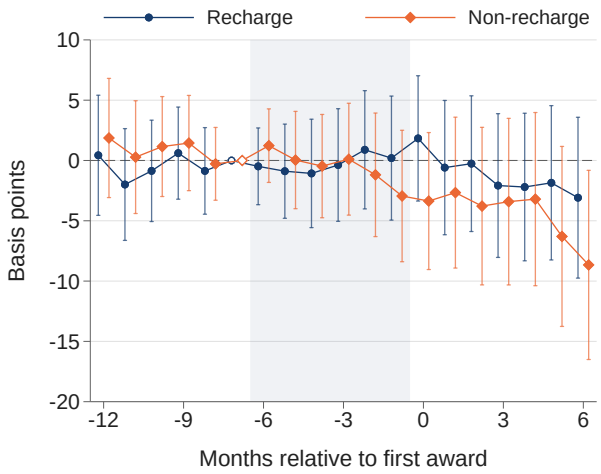
We measure lock-in at the firm level twelve months before the award, with claims and debt summed over all the firm's banks (subsection 4.4). Let

$$\text{Lock}_{ic} = \mathbf{1}\Big\{LS_{i,c-12} > 0\Big\} \tag{10}$$

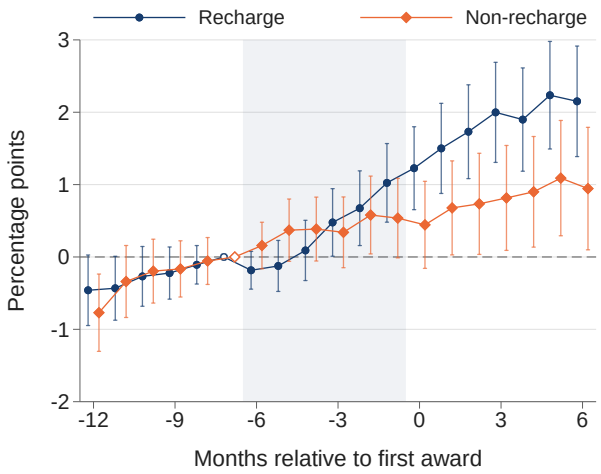
indicate a firm with real estate and positive excess collateral (3). In the model, positive excess is necessary for lock-in but not sufficient, since the firm is locked in only when its excess exceeds its residual claim (Definition 2), so Lock_{ic} marks the firms that can be locked

Figure 4: Parallel trends: first-time winners vs not-yet-winners

(a) Largest awards: interest rate



(b) Largest awards: total debt over assets



Notes: This figure plots the effects of the largest procurement awards in event time, separately for recharge and non-recharge countries. Winners whose first award is in the top tercile of award size, the award's value over total assets at event month -12, within country (Equation 8), for event months -12 to $+6$ relative to the first award. The recharge countries (Austria, Belgium, Germany, Spain, the Netherlands) and the non-recharge countries (France, Italy) are separate regressions; they share no firm and no fixed effect. Each panel plots, for the recharge and the non-recharge countries, θ_τ of the top-tercile winners, the coefficient on $\mathbf{1}\{t - c = \tau\}\text{Win}_{ic}$, from Equation 9 with a separate path for each tercile and for winners without a known positive award value or assets. The reference month is -7, the last month before the post window (hollow markers). The shaded area marks the anticipation window, months -6 to -1, which Post_{ct} of Equation 7 includes. Panel (a): amount-weighted average interest rate on the firm's outstanding debt, in basis points. Panel (b): total debt over total assets at event month -12, in percentage points. Both outcomes are winsorised at the 1st and 99th percentiles. Fixed effects: firm $\times$ cohort and cohort $\times$ country $\times$ month. Bars are 95% confidence intervals; standard errors clustered by firm. The joint F test that the coefficients of months -12 to -8 are zero has $p = 0.71$ (recharge) and 0.81 (non-recharge) in panel (a), and 0.53 and 0.02 in (b).

in. We estimate

$$\begin{aligned} y_{ict} =& \delta_1^g \text{Win}_{ic} \times \text{Post}_{ct} + \delta_2^g \text{Win}_{ic} \times \text{Post}_{ct} \times \text{Lock}_{ic} \\ &+ \delta_3^g \text{Post}_{ct} \times \text{Lock}_{ic} + \alpha_{ic} + \alpha_{kct} + \varepsilon_{ict}, \end{aligned} \tag{11}$$

with the terms of Equation 7 for the largest tercile, and standard errors clustered by firm. We estimate the regression separately for the recharge and the non-recharge countries, $g \in \{R, N\}$. δ_1^g is the effect of winning, and $\delta_1^g + \delta_2^g$ for firms with excess real estate collateral, relative to the not-yet-winners. The difference $\delta_1^R + \delta_2^R - (\delta_1^N + \delta_2^N)$ is our estimate of the markup. In the continuous variant, the lock-in share $LS_{i,c-12}$ replaces Lock_{ic}, with a share of zero for firms with real estate but without excess, and δ_2^g measures the change per unit of lock-in share.

Table 9 (Panel A) shows that for all firms, winners in recharge countries gain more unsecured debt but otherwise evolve similarly to winners in non-recharge countries. For firms with excess real estate, we estimate a markup of 21 basis points (Panel B). In France and Italy, winners with excess real estate pay 18 basis points less after the award than their matched not-yet-winners. Any bank can lend against their excess collateral. In the recharge countries, where only the incumbent can lend against it, the rate of winners with excess collateral does not move. The difference of 21 basis points is our estimate of the markup. It is the rate cut from excess collateral that the incumbent does not pass on to a locked-in firm. Debt is not significantly different, and neither is the probability of default as assessed by the firms' banks.

We test the mechanism directly on the intensive margin of excess collateral. In the model, lock-in is a threshold: the lock-in share measures how likely a firm is to be locked in, not how large its rent is (Prediction 2). Among winners that pledged real estate, the rate after the award rises with the lock-in share by 60 basis points per unit of share more in the recharge countries than in France and Italy (Panel C). The gap comes from France and Italy, where the rate falls with the share, by 50 (31) basis points per unit, while it does not change significantly with the share in the recharge countries. Debt falls with the share in the recharge countries, by 2.3 percentage points per unit, and does not change significantly

Table 9: Debt and rates after the largest awards, by excess collateral

		Debt / assets					
	Rate (bp)	Total	Secured	Unsecured	Incumbent	Outside banks	PD
	Panel A: Win × Post, all largest-award winners						
Recharge	-0.31	1.38***	-0.02	1.28***	0.08	0.70***	0.19
	(2.18)	(0.26)	(0.11)	(0.22)	(0.22)	(0.16)	(0.13)
Non-recharge	-3.33	0.87***	0.22	0.63***	0.01	0.46**	0.11
	(2.60)	(0.28)	(0.13)	(0.24)	(0.21)	(0.20)	(0.15)
Recharge − non-recharge	3.02	0.51	-0.23	0.66**	0.07	0.24	0.08
	(3.39)	(0.39)	(0.17)	(0.32)	(0.31)	(0.26)	(0.20)
	Panel B: Win × Post, firms with excess real estate collateral						
Recharge	3.24	-0.74	-1.04***	0.44	-0.57	-0.09	0.54
	(4.10)	(0.48)	(0.31)	(0.32)	(0.46)	(0.29)	(0.35)
Non-recharge	-18.21**	-1.08	-0.36	-0.34	-0.91	0.00	0.16
	(8.17)	(1.04)	(0.64)	(0.79)	(0.78)	(0.66)	(0.36)
Recharge − non-recharge	21.45**	0.35	-0.69	0.78	0.34	-0.09	0.37
	(9.14)	(1.14)	(0.71)	(0.86)	(0.90)	(0.72)	(0.51)
	Panel C: Win × Post × lock-in share, firms with real estate						
Recharge	10.64	-2.28*	-1.42	-1.08	-2.20*	-0.23	1.71*
	(11.44)	(1.27)	(0.92)	(0.80)	(1.27)	(0.76)	(1.00)
Non-recharge	-49.71	2.45	-0.32	1.93	0.07	1.70	0.09
	(31.24)	(3.84)	(2.67)	(2.85)	(2.61)	(2.41)	(1.10)
Recharge − non-recharge	60.35*	-4.73	-1.11	-3.01	-2.27	-1.93	1.62
	(33.26)	(4.04)	(2.82)	(2.96)	(2.90)	(2.53)	(1.48)
Recharge							
Mean	347.84	18.81	6.43	11.99	15.87	5.64	2.36
Mean lock-in share	0.49	0.48	0.48	0.48	0.49	0.49	0.53
Winners	15,938	18,911	18,911	18,911	15,834	15,834	13,137
Winners with excess	473	495	495	495	468	468	323
Control firm-cohorts	68,102	81,608	81,608	81,608	68,139	68,139	56,008
Non-recharge							
Mean	244.64	19.75	6.71	12.77	14.03	7.18	4.25
Mean lock-in share	0.60	0.60	0.60	0.60	0.60	0.60	0.61
Winners	14,894	15,558	15,558	15,558	13,983	13,983	15,774
Winners with excess	130	130	130	130	130	130	118
Control firm-cohorts	64,263	66,786	66,786	66,786	59,764	59,764	67,754

Notes: This table shows that after a large award, winners with excess collateral in recharge countries pay relatively higher rates. Top-tercile winners and their matched not-yet-winners, from the regression of Panel B of Table 8, estimated separately for the recharge countries (Austria, Belgium, Germany, Spain, the Netherlands) and the non-recharge countries (France, Italy). The two regressions share no firm and no fixed effect, so the variance of the difference is the sum of the two variances. Panel B is Equation 11 and reports $\delta_1^g + \delta_2^g$, the effect of winners with excess collateral against controls with excess collateral. Panel C replaces Lock_{ic} with $LS_{i,c-12}$ (4), zero for firms without excess, and reports δ_2^g. Figure C.2 plots the event-month paths. The incumbent is the firm's largest lender at event month −12 and outside banks are its other banks; both columns cover only firms with drawn bank debt at event month −12. In the bottom block, Mean is the constant of Panel A, and Winners and Control firm-cohorts count each column's sample over all award terciles; Winners with excess counts the top-tercile winners with excess collateral, Mean lock-in share their average $LS_{i,c-12}$. Fixed effects: firm × cohort and cohort × country × month. All outcomes are winsorised at the 1st and 99th percentiles. Rates in basis points, all other columns in percentage points; standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

in France and Italy.

The exogenous timing of the award also provides exogenous variation in the lock-in share. When firms take out their initial debt, they choose their rate of amortisation but do not know when the award materialises and therefore cannot predict how much capacity is amortised. Some firms make only one payment on F_0, do not have enough excess collateral for a credible recharge threat, and are therefore not effectively locked in. Other firms do not win an award for many months, repaying enough of the initial loan to make the recharge threat credible when they finally win. Firms therefore cannot anticipate whether their amortisation schedule will lock them in when they win the award.

The two designs measure different parts of the model's pricing. The comparison of new and re-pledged real estate estimates the subsidy and the markup together, on the typical loan secured by real estate (Prediction 1). The procurement design estimates how much the markup rises when the firm wins a large award. A markup of 21 basis points after the largest awards, against 14 basis points for the subsidy and markup of the typical loan, is therefore not at odds with the model.

Winners with excess collateral in recharge countries differ from those in France and Italy before the award. They are smaller, borrow from fewer banks, owe more of their debt to the incumbent, and have a larger secured share and a lower lock-in share (Table C.8). Their leverage, rates, and default probabilities do not differ significantly. Lock-in predicts the differences in banks and debt, and recharged follow-up loans absorb excess collateral, which lowers the share. Panel C of Table 9 compares winners at equal share. Their awards have similar shares of works and services but are smaller (Table C.6).

Assumption (2) does not require equal costs of lending in the two groups. Differences in the cost of funds, capital requirements or liquidation efficiency that are fixed for a firm or common to a country and month are absorbed by the fixed effects. It requires that the award changes the cost of lending to winners with excess collateral by the same amount. The award does so through the firms' leverage, default risk, and use of excess collateral. For these winners, neither debt nor banks' default probabilities change significantly in either group. The main threat to identification is that banks in the two groups value the firms' excess real estate differently. We measure excess collateral with allocated protection values, which

banks adjust for market conditions and liquidity. Since default risk does not change, any remaining lower valuation in France and Italy matters only through the use of the excess. If banks expect to recover less from real estate in non-recharge countries, they would lower rates by less. $\delta_1^N + \delta_2^N$ then understates the rate cut recharge firms would get, which biases our estimate of the markup towards zero.

6.4 Procurement awards reduce information asymmetries

Informational lock-in is the alternative source of the incumbent's market power. An incumbent with private information about a firm can hold it up, since outside banks cannot infer the firm's quality (Sharpe, 1990; Rajan, 1992). A procurement award is observable and verifiable, so outside banks can evaluate the firm's investment opportunity, and the incumbent's information advantage shrinks (Schenone, 2010). Recharge and information then predict opposite rate responses for firms tied to their bank. Under recharge, the incumbent keeps its market power, which rests on the recharge threat, not on information. Under informational lock-in, the award reduces hold-up, and more so in intense relationships, where the incumbent's information advantage is largest. We test whether awards level information in France and Italy, where recharge does not confound the test.

If the award reduces the information asymmetry between the incumbent and outside banks, the effect should be largest for relationships with the most private information, which we measure by the length of the relationship. Banks in long relationships should charge firms lower rates after winning an award than the control firms in long relationships relative to the difference for firms in shorter relationships.

The design is a triple difference based on Equation 7 for the largest award tercile. We interact $\text{Win}_{ic} \times \text{Post}_{ct}$ and Post_{ct} with indicators for the length of the firm's relationship with its incumbent, its largest lender by drawn debt, twelve months before the award. We expect the effect in France and Italy, the non-recharge countries. We run the following regression,

$$\begin{aligned} y_{ict} =& \delta_1 \text{Win}_{ic} \times \text{Post}_{ct} + \sum_j \delta_2^j \text{Win}_{ic} \times \text{Post}_{ct} \times Len_{ic}^j + \sum_j \delta_3^j \text{Post}_{ct} \times Len_{ic}^j \\ &+ \delta_4 \text{Win}_{ic} \times \text{Post}_{ct} \times NoDebt_{ic} + \delta_5 \text{Post}_{ct} \times NoDebt_{ic} + \alpha_{ic} + \alpha_{kct} + \varepsilon_{ict}, \end{aligned} \tag{12}$$

with Len_{ic}^{j} indicating that the firm's relationship with its incumbent is in length bin $j \in \{13\text{–}36, > 36, \text{before AnaCredit}\}$ months at event month -12, counted from the pair's first month with drawn debt in AnaCredit, and $NoDebt_{ic}$ that the firm has no drawn bank debt then. The base bin is a relationship of 0 to 12 months. We estimate the regression separately for the recharge and the non-recharge countries, on the cohorts whose event month -12 is October 2021 or later.

Table 10 shows that in France and Italy, winners whose relationship with their incumbent is 13 to 36 months old or started before AnaCredit pay 19 to 22 basis points less after the award than winners in relationships of up to 12 months, relative to their controls. This supports our assumption that procurement awards level information. In-sample relationships longer than 36 months show no difference. The event-month path of this difference shows no pre-trend (Figure C.3a). The coefficients in recharge countries, where relationship length can be correlated with lock-in, are positive but insignificant. Table C.9 shows that winners in France and Italy do not move their debt to other banks after the award, so the lower rates come from the lenders they already borrow from.

7 Discussion

Firms in recharge countries have access to state-contingent debt that is unavailable in non-recharge regimes. Firms in non-recharge countries cannot insure themselves against certain risk that firms in recharge countries can. Simultaneously, firms in recharge countries face frictions in contracting around recharge as it is the market standard and a property right. We show that this favours certain types of firms and projects within and across regimes and tilts their investment choices. Firms with real estate can credibly commit to banking relationships, in particular when financing multi-stage growth investments.

We observe the implications of recharge in the firm cross-section (Table 11): outside the real estate sector, firms in recharge countries are twice as likely to use real estate as collateral and have 63% higher tangibility, also within industry and size class (Table C.1). The gap in tangibility and propensity to pledge real estate between recharge and non-recharge countries falls in firm size. Small firms with worse access to external financing pledge real estate more

Table 10: Reducing information asymmetry

	Interest rate (bp)	
	Non-recharge	Recharge
	(1)	(2)
Win × Post	16.17	-7.67
	(9.86)	(8.30)
× relationship of 13 to 36 months	-22.39*	1.63
	(11.84)	(10.19)
× relationship over 36 months, in the data	-2.07	12.71
	(13.39)	(10.09)
× relationship before AnaCredit	-19.45*	7.67
	(11.17)	(9.64)
Winner firm-cohorts	7,961	9,928
Control firm-cohorts	29,992	38,214

Notes: This table tests whether awards level information: in France and Italy, they lower the rate by about 20 basis points more in relationships of 13 to 36 months than of up to 12 months. Winners whose first award is in the top tercile of award size within country and their matched not-yet-winners, estimated separately for the non-recharge countries (France, Italy) and the recharge countries (Austria, Belgium, Germany, Spain, the Netherlands). The outcome is the amount-weighted average interest rate on outstanding debt. The regression of Panel B of Table 8 adds Post_{ct} interacted with indicators for a relationship with the incumbent, the firm's largest lender at event month -12, of 13 to 36 months, of more than 36 months that started in AnaCredit, and already present in its first month (September 2018, of unknown length), and with an indicator for firms without drawn bank debt, each also interacted with every winner group. $\text{Win}_{ic} \times \text{Post}_{ct}$ is the post-award change for winners in relationships of up to 12 months; the three rows below are the additional change in longer relationships. The sample is the cohorts whose event month -12 is October 2021 or later, so that every relationship before AnaCredit is older than 36 months. Firm-cohorts count every award tercile. Table C.9 adds the outcomes of Table 9, Figure C.3 the event-month paths. Fixed effects: firm × cohort and cohort × country × month. Standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

often and hold more tangible assets. The recharge gap falls from 19 to 6 percentage points for the propensity to pledge real estate and from 15 to 6 percentage points for tangibility from micro to large firms (Panel A). Small firms in recharge countries pledge and hold more, while in France and Italy neither varies much with firm size. For firm age, the recharge gap for real estate collateral is smallest for young firms and rises for older firms, from 12 percentage points for firms up to two years old to about 20 for firms older than ten years. The gap in tangibility rises up to 20 years in age (Panel B).

Table 11: Real estate pledging and asset tangibility in recharge and non-recharge countries

	Real estate pledging (%)			Asset tangibility (%)		
	Recharge	No recharge	Difference	Recharge	No recharge	Difference
	Panel A: By firm size					
Micro	31	12	19	34	19	15
Small	31	13	18	28	19	9
Medium	31	15	16	27	18	9
Large	20	14	6	25	19	6
	Panel B: By firm age					
0–2 years	22	10	12	32	20	12
3–5 years	23	10	13	31	18	13
6–10 years	26	10	16	31	18	13
11–20 years	34	13	21	33	18	15
Over 20 years	34	15	19	30	21	9
Unit of observation	Firm-month			Firm-year		

Notes: This table examines how real estate pledging and asset tangibility vary with firm size and age in recharge and non-recharge countries. Firms outside real estate (NACE division 68) with an industry code, in the recharge countries Austria, Belgium, Germany, Spain, and the Netherlands and the non-recharge countries France and Italy; Recharge and No recharge pool the firms of each group. Real estate pledging is the share of firm-months with committed (drawn plus undrawn) debt that have debt secured by real estate, from September 2018 to June 2026; a firm-month has debt secured by real estate if it has secured committed debt and real estate is allocated to it. Asset tangibility is tangible fixed assets over total assets from Orbis, capped at 0 and 100%, in firm-years with committed debt in the month of the balance-sheet closing date. Size classes are the enterprise size reported in AnaCredit; age is in completed years since the firm's birth date in the AnaCredit counterparty data. The differences are between the rounded means, in percentage points. Table C.1 reports the differences within industry and size class.

We argue that, in equilibrium, firms invest in real estate to access financing and create commitment with banks. Large firms that have access to alternative sources of financing do not need to rely on rechargeable real estate, use it less, and hold fewer tangible assets. We propose that this has two key implications for the euro area: (1) young firms have potentially

less access to financing relative to established firms than in non-recharge countries, and (2) firms in recharge countries are more exposed to the boom-bust cycle of real estate, since real estate shocks affect firm investment (Chaney et al., 2012), also in AnaCredit (Degryse et al., 2026).

In our model, recharge is particularly valuable for risky, low-tangibility follow-up investment, such as long-term innovation projects. Since, in equilibrium, more constrained firms invest more in real estate, we speculate that firms without it, young firms, are worse at committing to exclusivity. If banks rely on collateral to finance multi-stage growth investments, young firms are disadvantaged in pursuing innovative projects. We turn to an investment and financing survey for some preliminary answers.

The ECB and European Commission *Survey on the Access to Finance of Enterprises* (SAFE) collects firm-level responses on the financial situation of enterprises. It also includes questions about their innovation activities. The collateral-related questions reflect recharge. Firms in recharge countries do not post collateral for their most recent loan significantly more often than firms in France and Italy, 58 against 49%, but they pledge land or buildings for 53% of these secured loans, against 28%.[20] In terms of innovation, there is no difference between recharge and non-recharge countries overall: 52 and 54% of firms innovated in the past twelve months. However, young firms (age below 10 years) report a smaller innovation lead over older firms in recharge countries, 6.4 against 9.1 percentage points. A banking system reliant on real estate collateral advantages established firms in financing long-term projects.

8 Conclusion

We study how property rights to future seniority credibly commit firms to exclusive banking relationships. In many euro area countries, real estate collateral includes a recharge right:

[20] We use the SAFE microdata for the five recharge countries and France and Italy. The collateral questions refer to the firm's most recent bank loan, in the survey round of the second half of 2014. Innovation is any new product, production process, organisation of management, or way of selling in the past twelve months, in all rounds that ask about it. Country means are adjusted for survey round, size class, sector, and age class, and the gaps between young and older firms are estimated within country. Group means weight the countries equally.

the firm and its bank can secure new loans under the bank's existing claim, ahead of liens other lenders have registered since. Because outside lenders price this risk of subordination, the incumbent bank gains market power over future financing without any information advantage. Competition for the initial loan turns this markup into an upfront subsidy, so firms can pledge future growth today. Using AnaCredit and the plausibly exogenous timing of procurement awards, we find that firms obtain a discount when they first pledge real estate, 14 basis points relative to re-pledged real estate, and pay a markup of 21 basis points when they need follow-up financing, but only in countries with recharge. Our findings highlight the real effects of property law, which shapes how firms borrow and invest.

The prevalence of real estate collateral in recharge countries raises questions about the equilibrium of bank financing. First, is commitment through real estate collateral a substitute for commitment through information, and does banks' heavy reliance on it reduce other financing options? Banks that can rely on collateral have less reason to produce information about their borrowers (Manove et al., 2001), and information quality declines during periods of rapid local house price appreciation (Howes & Weitzner, 2025). Firms without real estate may then lose access to both forms of commitment. Is recharge then a preference, or the only way for SMEs to secure financing?

Second, if property rights differ across countries and shape which forms of commitment are available, how do they affect cross-country differences in firm activity? Commitment through collateral helps finance long-term projects, but only for firms with real estate in place. Compared with the US, Europe has fewer young firms among its leading innovators (Cincera & Veugelers, 2013), and in survey data young firms' innovation lead over established firms is smaller in recharge countries. Whether differences in property rights contribute to these gaps and to differences in productivity growth across European countries, and which reforms of property law could close them, remain open questions. Where the firm holds the recharge right, as in France, and in Spain if the 2026 ruling holds, recharge does not tie the firm to its bank, but established firms lose a way to commit to it. A reform has to weigh this commitment against the access to financing of firms without real estate.

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Appendix

A Legal sources

This appendix gives the legal sources for section 2 by country. Costs are our calculations from the fee schedules for a new first-ranking claim of €1.5 million securing a loan of €1 million, as shares of the registered amount. In Belgium and France, registration makes the claim effective against third parties rather than valid (Schmid & Hertel, 2005, p. 87). European Mortgage Federation (2007, pp. 7-10) and Schmid and Hertel (2005, ch. 7) compare the mortgage laws of all seven countries, and Stöcker and Stürner (2010) those of all but Italy.

A.1 Germany

Registration and rank. §§ 873 Abs. 1, 879 Abs. 1 and 1115 Abs. 1 of the Bürgerliches Gesetzbuch (BGB) in der Fassung der Bekanntmachung vom 2. Januar 2002 (BGBl. I S. 42, 2909; 2003 I S. 738).

Rechargeable claim. The land charge (*Grundschuld*), §§ 1191-1192 BGB, as opposed to the accessory mortgage (*Hypothek*), § 1113 BGB. It goes back to Mecklenburg's Ritterschaftliche Hypothekenordnung of 1819 and the Prussian Gesetz über den Eigenthumserwerb und die dingliche Belastung der Grundstücke, Bergwerke und selbstständigen Gerechtigkeiten vom 5. Mai 1872 (PrGS 1872 S. 433, § 19; Buchholz, 1978; van Vliet, 2012), and it is the market standard (Stöcker & Stürner, 2010, p. 46).

Rank of recharged debt. § 879 Abs. 1 BGB; the land charge keeps its registered rank whichever debts it secures (§ 1192 Abs. 1 BGB).

Release and cancellation. The security agreement limits recovery to the secured debt and gives the firm a claim to the return of the land charge (Müller, 2012), also against later holders (§ 1192 Abs. 1a BGB). The release claim for revolving security and its 110% and 150% thresholds are from BGH, Großer Senat für Zivilsachen, Beschluss vom 27. November 1997, GSZ 1/97 und GSZ 2/97, BGHZ 137, 212.

Registration costs. 0.3%, and 0.5% for claims of around €100,000: one notary and one

land-registry fee under Nr. 21200 and 14121 of the Kostenverzeichnis to the Gerichts- und Notarkostengesetz (GNotKG) vom 23. Juli 2013 (BGBl. I S. 2586).

Prepayment. Compensation, § 490 Abs. 2 Satz 3 BGB; termination without compensation after ten years, § 489 Abs. 1 Nr. 2 BGB; the cap in § 502 Abs. 3 BGB applies to consumers only.

A.2 Austria

Registration and rank. § 451 Abs 1 of the Allgemeines bürgerliches Gesetzbuch (ABGB, JGS Nr. 946/1811); §§ 14 Abs 1 and 29 Abs 1 of the Allgemeines Grundbuchsgesetz 1955 (GBG, BGBl. Nr. 39/1955).

Rechargeable claim. The maximum-amount mortgage (*Höchstbetragshypothek*), § 14 Abs 2 GBG, used for lending relationships (Moser & Schwitzer, 2021) and typically registered at 120-130% of the loan (OPTIFIN, n.d.).

Rank of recharged debt. §§ 14 Abs 2 and 29 Abs 1 GBG.

Release and cancellation. § 469 ABGB.

Registration costs. 1.2%: the registration fee (*Eintragungsgebühr*) under Tarifpost 9 lit b Z 4 of the Gerichtsgebührengesetz (GGG, BGBl. Nr. 501/1984); the 1% duty on mortgage deeds (§ 33 TP 18 Gebührengesetz 1957, BGBl. Nr. 267/1957) is waived for claims securing loans (§ 20 Z 5 GebG).

A.3 Belgium

Registration and rank. Arts. 78, 80 al. 1 and 81 of the Loi hypothécaire du 16 décembre 1851 / Hypotheekwet van 16 december 1851 (M.B. 22 décembre 1851, p. 3555); extinction with the debt, art. 108.

Rechargeable claim. The all-sums mortgage (*hypothèque pour toutes sommes / hypotheek voor alle sommen*), art. 81bis, inserted from 1 April 2015 by art. 20 of the Loi du 19 avril 2014 portant insertion du livre VII [...] dans le Code de droit économique (M.B. 28 mai 2014, p. 41686); before 2015, the credit-opening mortgage of art. 80 al. 3.

Rank of recharged debt. Art. 81bis § 1.

Release and cancellation. Art. 81bis § 2: termination on three to six months' notice.

Registration costs. 1.4%: a 1% registration duty under art. 87 of the Code des droits d'enregistrement, d'hypothèque et de greffe / Wetboek der registratie-, hypotheek- en griffierechten (Arrêté royal n° 64 du 30 novembre 1939, M.B. 1er décembre 1939), in Flanders art. 2.11.4.0.1 of the Vlaamse Codex Fiscaliteit, and a 0.3% mortgage duty under art. 262 of the same code, plus notary fees.

Prepayment. Art. 9 of the Loi du 21 décembre 2013 relative à diverses dispositions concernant le financement des petites et moyennes entreprises (M.B. 31 décembre 2013, p. 104012) caps the indemnity at six months' interest on SME credits of up to €2 million, the threshold since the Loi du 21 décembre 2017 (M.B. 29 décembre 2017, p. 116561); art. 1907bis of the old Civil Code sets the same cap for interest-bearing loans to all borrowers, but not for credit openings.

A.4 The Netherlands

Registration and rank. Arts. 3:21 lid 1 and 3:260 lid 1 of the Burgerlijk Wetboek (BW).

Rechargeable claim. The all-monies bank mortgage, the *bankhypotheek*, on the basis of art. 3:231 lid 1 BW (Steneker, 2013), with a registered maximum (art. 3:260 lid 1 BW) of typically the principal plus 40% (DLA Piper, 2026).

Rank of recharged debt. Art. 3:21 lid 1 BW; the mortgage ranks from its registration, not from when the secured claims arise (Alkema, 2023).

Release and cancellation. Art. 3:274 lid 1 BW.

Registration costs. 0.1%: unregulated notary fees and a fixed Kadaster fee of €181 (art. 2 Tarievenregeling Kadaster); no tax.

A.5 Spain

Registration and rank. Art. 1875 of the Código Civil (Real Decreto de 24 de julio de 1889, Gaceta de Madrid núm. 206, de 25 de julio de 1889); arts. 9, 12, 24 and 25 of the Ley Hipotecaria (LH; Decreto de 8 de febrero de 1946, BOE núm. 58, de 27 de febrero de 1946).

Rechargeable claim. The *hipoteca recargable*, art. 4.2 and 4.3 of the Ley 2/1994, de 30 de

marzo, sobre subrogación y modificación de préstamos hipotecarios (BOE núm. 80, de 4 de abril de 1994), as worded by art. 13.2 of the Ley 41/2007, de 7 de diciembre (BOE núm. 294, de 8 de diciembre de 2007), for mortgages created since then; the recharge is limited to the initial capital (Resolución de la DGRN de 14 de mayo de 2015, BOE núm. 137, de 9 de junio de 2015).

Rank of recharged debt. Art. 4.3 Ley 2/1994: an increase in the secured amount or a term extension keeps the rank only with the consent of later right holders.

Maximum-amount mortgage. The *hipoteca flotante*, art. 153 bis LH, open only to financial institutions and public administrations (Follía & Bros, 2021).

Registration costs. 0.8% in Madrid and up to 2.1% elsewhere: stamp duty (*Impuesto sobre Actos Jurídicos Documentados*) at regional rates from 0.75% in Madrid to 2% in Catalonia, Valencia and Extremadura (art. 31.2 Real Decreto Legislativo 1/1993, de 24 de septiembre, BOE núm. 251, de 20 de octubre de 1993), plus notary and registry fees. A recharge pays the duty on the additional amount and reduced fees (art. 8 Ley 2/1994).

Prepayment. Arts. 7-9 of Ley 41/2007 cap charges on mortgage loans to small companies (*empresas de reducida dimensión*).

A.6 France

Registration and rank. Arts. 2414, 2417, 2418 and 2421 of the Code civil (C. civ.), in the numbering of the Ordonnance nº 2021-1192 du 15 septembre 2021 portant réforme du droit des sûretés (JORF nº 0216 du 16 septembre 2021, texte nº 19), in force since 1 January 2022; extinction with the debt, art. 2474.

Rechargeable claim. The *hypothèque rechargeable*, created as art. 2422 by art. 20 of the Ordonnance nº 2006-346 du 23 mars 2006 relative aux sûretés (JORF nº 71 du 24 mars 2006, texte nº 29), which the Rapport au Président de la République (same JORF, texte nº 28) calls "l'une des innovations majeures" of a reform to make security rights "lisibles et efficaces". Art. 46 of the Loi nº 2014-344 du 17 mars 2014 relative à la consommation (JORF nº 0065 du 18 mars 2014) repealed it for contracts from 1 July 2014, and art. 48 of the Loi nº 2014-1545 du 20 décembre 2014 relative à la simplification de la vie des entreprises (JORF

n° 0295 du 21 décembre 2014) reinstated it for professional purposes; it is now art. 2416.

Firm's recharge right. The firm can offer the recharge to any creditor, and contrary clauses are void: art. 2416 al. 2 ("nonobstant toute clause contraire"); before 2022, art. 2422 al. 2 and 6 ancien.

Rank of recharged debt. Art. 2420: a recharge ranks from its own publication against other creditors of the same mortgage and, since 2022, against all statutory and court-ordered mortgages; before 2022, only against those of the tax authority and social-security bodies and conservatory court-ordered mortgages (art. 2425 ancien).

Mortgage for future debts. Art. 2415 (art. 2421 ancien).

Registration costs. 1.1%: the land registration tax (*taxe de publicité foncière*) of 0.70% (art. 844 of the Code général des impôts, CGI) and the *contribution de sécurité immobilière* of 0.05% (art. 881 H CGI), plus regulated notary fees.

A.7 Italy

Registration and rank. Arts. 2808, 2809 and 2852 of the Codice civile (c.c.; R.D. 16 marzo 1942, n. 262, G.U. n. 79 del 4 aprile 1942); extinction with the debt, art. 2878.

Mortgage for future credits. Art. 2852: rank from registration also for credits that may arise from an existing relationship, such as a credit opening, but not for loans not yet contracted (Cass. civ., sez. II, 3 aprile 2000, n. 3997; Cass. civ., sez. III, 27 agosto 2014, n. 18325).

Registration costs. 0.4%: the substitute tax (*imposta sostitutiva*) of 0.25% of the loan (artt. 15-18 D.P.R. 29 settembre 1973, n. 601, G.U. n. 268 del 16 ottobre 1973, suppl. ord.), a fixed registry fee of €35 and unregulated notary fees.

A.8 United States

Obligatory and optional advances. Rosenthal & Rosenthal, Inc. v. Benun, 226 N.J. 41, 140 A.3d 547 (2016); Nelson and Whitman (1995); Restatement (Third) of Property: Mortgages §§ 2.3, 7.3 (Am. L. Inst. 1997).

Conditional advances. Nat'l Bank of Wash. v. Equity Invs., 81 Wash. 2d 886, 506 P.2d 20 (1973).

State statutes. Fla. Stat. § 697.04(1)(a), (3) (2026); Iowa Code § 654.12A (2026); Md. Code Ann., Real Prop. § 7-102 (2026); Mo. Rev. Stat. § 443.055(5) (2016); Wash. Rev. Code § 61.12.190, enacted by 2023 Wash. Sess. Laws ch. 76. For credit-line mortgages: N.Y. Real Prop. Law § 281(2) (McKinney 2026); Or. Rev. Stat. § 86.155(2) (2025); Va. Code Ann. § 55.1-318(C) (2026).

B Proofs

Proof of Lemma 1. Suppose the outsider lends ℓ_1 at face value F_1, with a senior lien on $\zeta_1 I_1$ and a junior lien on $\zeta_0 I_0$. After the follow-up investment, the incumbent recharges a loan $B \leq \gamma\zeta_0 I_0$ on $\zeta_0 I_0$. It ranks ahead of the outsider and is covered by the liquidation value of the asset, so it is risk-free. The firm pays B out to shareholders. In the high final state, the firm repays both loans and the recharge nets out. In the low final state, the firm defaults if B exceeds its residual claim $\underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 - F_1$. It then loses the residual claim but keeps B. The gain from the recharge is therefore

$$q \max\left(B - (\underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 - F_1), 0\right),$$

which is largest at $B = \gamma\zeta_0 I_0$ and positive whenever the residual claim is below $\gamma\zeta_0 I_0$. Under the non-contingent contract, $F_0^{\text{nc}} > \underline{X}_1 + \zeta_0 I_0$ by A1, so even at break-even, $F_1 = \ell_1$, the residual claim is below its value at $F_0 = \underline{F}_0$, and condition (i) of Proposition 2 makes the recharge profitable. Any risky $F_1 > \ell_1$ lowers the residual claim further. In default, the incumbent recovers $\gamma\zeta_0 I_0$ from the initial assets and the outsider recovers $\underline{X}_2 + \gamma\zeta_1 I_1$, which gives the outsider's break-even face value $F_1 = (\ell_1 - q(\underline{X}_2 + \gamma\zeta_1 I_1))/(1-q)$. □

Proof of Proposition 1. If the firm borrows from the outsider, it recharges (Lemma 1). The outsider and the recharged loan break even, so the firm bears the expected fire-sale loss and

its value is

$$\mathbb{E}(X_2) + \zeta_0 I_0 + \zeta_1 I_1 - \ell_1 - q(1-\gamma)(\zeta_0 I_0 + \zeta_1 I_1).$$

The incumbent holds every claim on the firm and does not dilute itself. For $F_1 \leq \underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1$, its loan is risk-free and the firm's value is $\mathbb{E}(X_2) + \zeta_0 I_0 + \zeta_1 I_1 - F_1$. At break-even, $F_1 = \ell_1$, the firm gains $S_1 = q(1-\gamma)(\zeta_0 I_0 + \zeta_1 I_1)$ over the outside option, while the incumbent earns nothing without an agreement. Nash bargaining over risk-free contracts gives the incumbent λS_1, so $F_1 = \ell_1 + \lambda S_1$, which is risk-free as long as $\lambda S_1 \leq W = \underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 - \ell_1$. A face value above $\ell_1 + W$ defaults in the low final state. The incumbent then recovers $\underline{X}_2 + \gamma(\zeta_0 I_0 + \zeta_1 I_1)$, the same as the outsider and the recharged loan together, so the joint value of the firm and the incumbent falls back to the outside option and there is no surplus to bargain over. Any risky contract the firm accepts leaves the incumbent at most its disagreement payoff of zero. The incumbent therefore charges $\min(\lambda S_1, W) = \bar{\lambda} S_1$. □

Proof of Proposition 2. If. In the bad state, the firm repays $F_0 = \underline{X}_1 + \zeta_0 I_0$ from its cash and the sale of the initial assets at full value, so there is no fire-sale. In the good state, the follow-up loan is $\ell_1 = I_1 - \overline{X}_1 + \underline{X}_1 + \zeta_0 I_0$, and the firm's residual claim in the low final state at break-even is $W = \underline{X}_2 + \zeta_1 I_1 + \overline{X}_1 - \underline{X}_1 - I_1$. By (i), the recharge threat is credible (Lemma 1), and by Proposition 1, L_1^{inc} is risk-free with markup $\bar{\lambda} S_1$. The incumbent receives F_0 in both states and the markup in the good state, an expected repayment of $F_0 + (1-p)\bar{\lambda} S_1 = \ell_0$, so it breaks even. Since $I_0 = \underline{F}_0 + (1-p)(\overline{F}_0 - \underline{F}_0)$, $\ell_0 \geq I_0$ by (ii). No state defaults, and since banks break even, the firm receives the first-best value, including the payout $\ell_0 - I_0$.

Only if. The first-best requires that the bad state repays without a fire-sale, $F_0 \leq \underline{F}_0$. Since W falls in F_0, it is at least its value at $\underline{F}_0$ for any such F_0. If (i) fails, an outsider can then lend the follow-up at break-even without being diluted (Lemma 1), so the incumbent earns no markup and receives at most $\underline{F}_0 < I_0$ by A1. If (ii) fails, consider a bank lending at $F_0 \leq \underline{F}_0$. By Proposition 1, its markup is at most $\max(0, \min(\lambda S_1, W))$, with W evaluated at F_0. Since W falls one for one in F_0, the bank's expected repayment rises in F_0 and is at most $\underline{F}_0 + (1-p)\max(0, \bar{\lambda} S_1) < I_0$, with $\bar{\lambda}$ evaluated at $\underline{F}_0$. In both cases no bank finances the initial investment at $F_0 \leq \underline{F}_0$, and every equilibrium defaults in the bad state. □

Two-period debt. With an amortisation payment D, the remaining balance $F_0 - D$ stays senior on $\zeta_0 I_0$, the follow-up loan is $\ell_1 = I_1 - \overline{X}_1 + D$, and the incumbent can recharge up to the excess collateral $E_0 = \gamma\zeta_0 I_0 - (F_0 - D)$ without risk. The firm's residual claim in the low final state at break-even is

$$\underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 - (F_0 - D) - \ell_1 = \underline{X}_2 + \zeta_0 I_0 + \zeta_1 I_1 - F_0 - I_1 + \overline{X}_1,$$

which does not depend on D. As in Lemma 1, the threat is credible when E_0 exceeds this residual claim, and E_0 rises one for one in D. Since $D \leq F_0$, full repayment creates the strongest threat, and the one-period model is the case $D = F_0$.

Proof of Corollary 1. By the two-period debt case, the threat is credible when E_0 exceeds the firm's residual claim in the low final state, which does not depend on D. Under the contract of Proposition 2, $F_0 = \underline{X}_1 + \zeta_0 I_0$, and at $D = F_0$ this condition is (i) of Proposition 2. If it holds, some $D \leq F_0$ activates the threat, and if $\bar{\lambda} S_1 \geq \overline{F}_0 - \underline{F}_0$, the contracts of Proposition 2 implement the first-best. With $D = 0$, $E_0 = \gamma\zeta_0 I_0 - F_0 < 0$, so the incumbent has no market power, the initial loan is $L_0^{*,\mathrm{nc}}$, and the firm defaults in the bad state by A1, losing $p(1-\gamma)\zeta_0 I_0$. If (i) fails, no $D \leq F_0$ activates the threat. If $\bar{\lambda} S_1 < \overline{F}_0 - \underline{F}_0$, the firm defaults in the bad state with or without the threat (Proposition 2), and since banks break even, firm value does not depend on D. For the comparative statics, W at $F_0 = \underline{F}_0$ does not depend on $\zeta_0 I_0$ or q, while $\gamma\zeta_0 I_0$ rises in $\zeta_0 I_0$. The gap $\overline{F}_0 - \underline{F}_0 = (I_0 - \underline{X}_1 - \zeta_0 I_0)/(1-p)$ falls in $\zeta_0 I_0$, while $\bar{\lambda} S_1 = \min(\lambda S_1, W)$ weakly rises in $\zeta_0 I_0$ and q, since W at $F_0 = \underline{F}_0$ depends on neither. □

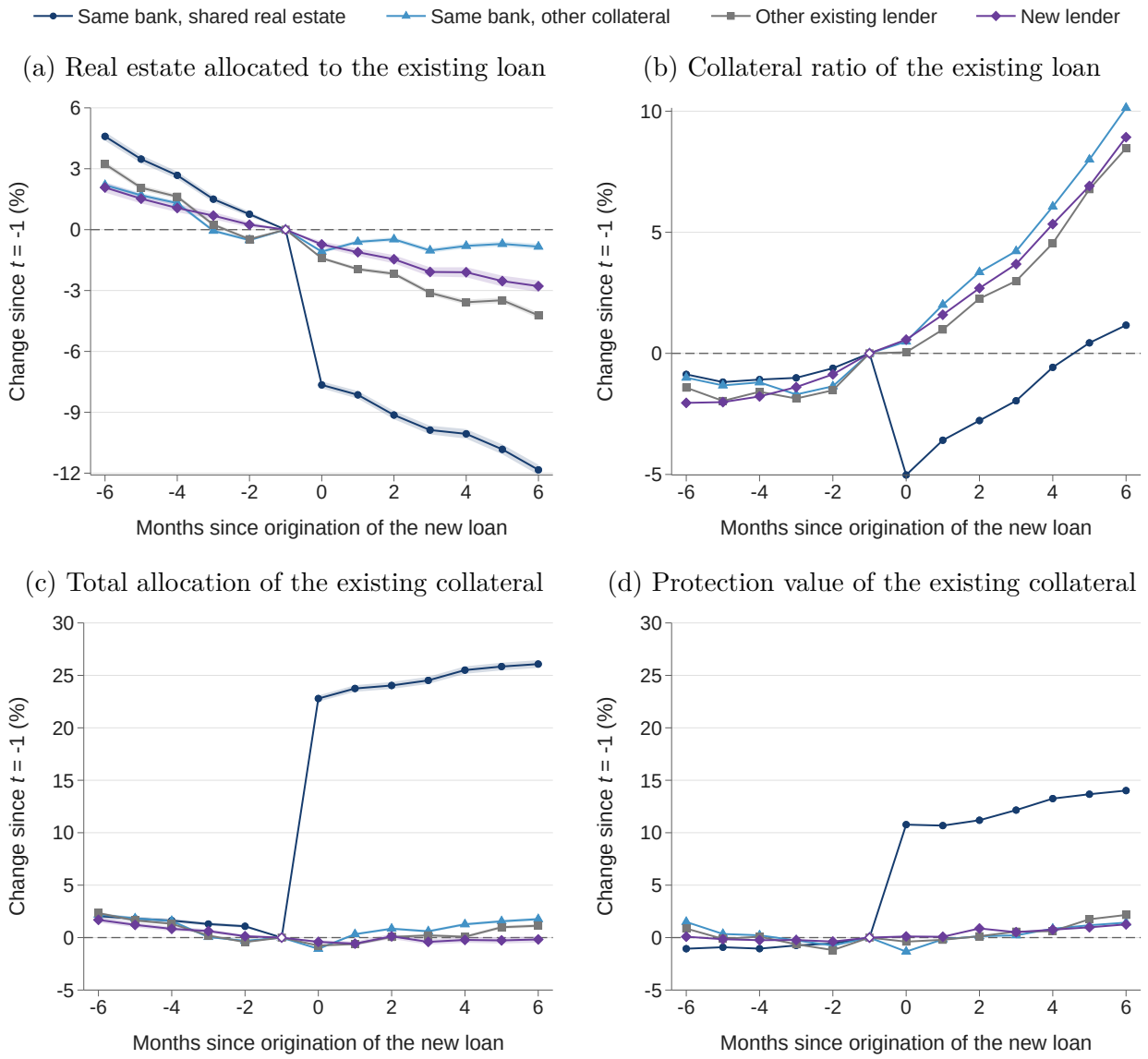
C Additional empirical results

Table C.1: Real estate pledging and asset tangibility within industry and size class

	Real estate pledging			Asset tangibility		
	(1)	(2)	(3)	(4)	(5)	(6)
Recharge country	17.8***	17.8***	17.3***	12.0***	11.9***	12.1***
	(0.05)	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
NACE division FE	No	Yes	Yes	No	Yes	Yes
Size class FE	No	No	Yes	No	No	Yes
Mean, no recharge (%)	12.6	12.6	12.6	19.2	19.2	19.2
Unit of observation	Firm-month			Firm-year		
Observations	165,696,363			9,388,777		
Firms	2,752,995			2,259,852		

Notes: This table reports linear regressions on an indicator for the recharge countries Austria, Belgium, Germany, Spain, and the Netherlands, for firms outside real estate (NACE division 68) with an industry code in the seven countries. In columns (1) to (3), the outcome is an indicator that a firm-month has debt secured by real estate, in percentage points, and the unit of observation is a firm-month with committed (drawn plus undrawn) debt from September 2018 to June 2026. A firm-month has debt secured by real estate if it has secured committed debt and real estate is allocated to it. In columns (4) to (6), the outcome is asset tangibility, tangible fixed assets over total assets from Orbis, capped at 0 and 100%, and the unit of observation is a firm-year with committed debt in the month of the balance-sheet closing date; month fixed effects are for the closing month. Size class fixed effects use the enterprise size reported in AnaCredit, with firms without a reported size as a class of their own. Mean, no recharge is the mean of the dependent variable in France and Italy. Standard errors, clustered by firm, in parentheses; they take the seven countries as fixed, so the coefficient is a conditional difference between the two country groups. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure C.1: Collateral around a new loan, by lender and collateral of the new loan



Notes: All panels follow existing real-estate-secured term loans around the firm's first new loan, by the lender and collateral of the new loan: the same bank with real estate that already secures the existing loan (shared collateral), the same bank with other collateral, another lender the firm already borrows from, or a new lender. Panel (a) plots the real estate allocated to the existing loan, panel (b) its collateral ratio, panel (c) the total allocation of its real estate, summed over all the loans at the bank that the real estate secures, and panel (d) the protection value of the real estate behind it. All series are percent changes since $t = -1$ and pooled over the seven countries. Shaded areas in panels (a) and (c) are 95% confidence intervals of the mean.

Table C.2: Rate plus spread on loans secured by new real estate, by country

	Recharge					Non-recharge	
	AT	BE	DE	ES	NL	FR	IT
Panel A: Baseline							
New RE (β_1^k)	4.8**	-15.4***	-6.2**	-17.5*	-8.1	2.0	-6.7
	(2.2)	(3.9)	(2.6)	(10.5)	(12.8)	(2.2)	(7.4)
Panel B: Headline							
New RE, new relationship (β_1^k)	1.9	-24.7***	12.4	-24.6**	-8.4	0.7	-24.1
	(10.8)	(4.9)	(25.4)	(12.0)	(23.5)	(2.7)	(32.7)
New − previous RE, existing relationship							
1–12 months ($\beta_{2,1-12}^k$)	4.0	-22.8***	-9.7	-12.8	-5.4	-0.1	-12.5
	(6.1)	(5.2)	(19.3)	(11.2)	(8.0)	(4.2)	(13.1)
13–36 months ($\beta_{2,13-36}^k$)	-15.4**	-20.2***	-8.6	-12.1	-15.3	-0.0	-7.5
	(6.3)	(4.1)	(12.0)	(9.8)	(15.2)	(3.3)	(12.3)
over 36 months, in the data ($\beta_{2,>36}^k$)	-13.2**	4.5***	-9.6**	9.3	-12.8	0.3	-4.9*
	(5.2)	(1.7)	(4.3)	(7.0)	(17.5)	(3.2)	(2.6)
before AnaCredit ($\beta_{2,pre}^k$)	11.8***	-12.0**	-6.8***	-40.9	4.0	4.4**	-11.5
	(3.4)	(4.8)	(2.3)	(27.0)	(9.4)	(1.9)	(7.6)
$\beta_1^k - \beta_{2,1-12}^k$	-2.1	-1.9	22.1	-11.8	-3.0	0.8	-11.6
	(8.1)	(4.4)	(24.5)	(8.3)	(20.4)	(3.5)	(22.9)
Panel C: Country weight within group							
Regression							
Baseline: new RE	0.032	0.882	0.066	0.004	0.016	0.612	0.388
Headline: new relationship	0.013	0.940	0.020	0.006	0.021	0.792	0.208
Headline: 1–12 months	0.027	0.920	0.019	0.009	0.026	0.726	0.274
Headline: 13–36 months	0.015	0.945	0.013	0.009	0.018	0.675	0.325
Headline: over 36 months, in the data	0.016	0.933	0.032	0.003	0.015	0.630	0.370
Headline: before AnaCredit	0.062	0.788	0.134	0.001	0.015	0.728	0.272
RE relationships	0.113	0.236	0.296	0.293	0.062	0.458	0.542
RE debt	0.179	0.105	0.549	0.105	0.062	0.511	0.489
Obs.	569,471						

Notes: This table reports country-level estimates of the discount on new real estate. Country coefficients of Equation 5 (Panel A) and of the headline specification of Table 7 (Panel B) on the loans secured by real estate, with the fixed effects of column (4) of Table 6. The outcome is the spread over the reference rate for variable-rate loans and the agreed rate for all other loans, in basis points; variable-rate loans without a reported spread are dropped. The spread is winsorised at the 1st and 99th percentiles, pooled over the seven countries. Panel C gives each country's share within its group in the three group aggregates. The regression weight is the weight of the country's coefficient in the group coefficient of the joint regression: in Panel A the country's share of the variation in New RE left after the fixed effects and controls, in Panel B one weight per key term, as the group coefficients also load on a country's other key terms (loadings that sum to zero within the group). The RE-relationship weight is the share of firm-bank relationships with real estate allocated (monthly shares, averaged) and the RE-debt weight the share of mean monthly debt secured by real estate, both in the firm panel from January 2022 and the same for every term. Standard errors, clustered by firm and bank, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.3: Interest rates on loans secured by new and re-pledged real estate: country weights

Country weights	(1) Regression	(2) RE relationships	(3) RE debt
	Panel A: Recharge		
New RE (β_1^R)	-14.1***	-10.6***	-6.5***
	(3.4)	(3.4)	(2.0)
	Panel B: Non-recharge Placebo		
New RE (β_1^N)	-1.4	-2.7	-2.3
	(3.2)	(4.2)	(3.8)
$\beta_1^R - \beta_1^N$	-12.7***	-7.8	-4.3
	(4.7)	(5.1)	(4.2)
Permutation rank of $\beta_1^R - \beta_1^N$	6/21	5/21	6/21
	Panel C: Country weight within group		
AT	0.032	0.113	0.179
BE	0.882	0.236	0.105
DE	0.066	0.296	0.549
ES	0.004	0.293	0.105
NL	0.016	0.062	0.062
FR	0.612	0.458	0.511
IT	0.388	0.542	0.489
Loan-term FE		Yes	
Firm FE		No	
Bank-month FE		Yes	
Firm-bank FE		Yes	
Obs.		569,471	
R2		0.78	

Notes: This table checks the robustness of the discount on new real estate to alternative country weights. Estimates of Equation 5 with the fixed effects of column (4) of Table 6. The country coefficients of Table C.2, Panel A, are aggregated to the two groups with three weights: the regression's own, as in Table 6 (column 1); each country's share within its group of the firm-bank relationships with real estate allocated (column 2); and its share within its group of mean monthly debt secured by real estate (column 3), both in the firm panel from January 2022 (monthly shares, averaged). Panel C gives the weights; AT, BE, DE, ES, and NL are the recharge countries, FR and IT the non-recharge countries. Outcome, sample, and permutation ranks as in Table 6. Standard errors, clustered by firm and bank, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4: Procurement award data quality

	AT	BE	DE	ES	NL	FR	IT	All
Bid deadline to award decision								
p25	45	58	29	25	35	45	9	23
p50	98	99	46	51	57	80	32	49
p75	189	170	75	105	105	144	82	100
Award decision to award notice								
p25	9	10	7	8	11	18	14	10
p50	21	25	19	21	30	39	73	30
p75	42	57	38	43	73	79	243	83
Bid deadline to award notice								
p25	66	79	46	104	66	83	58	65
p50	124	129	69	151	98	126	144	113
p75	196	213	112	231	162	199	309	196
No award value (%)	49	60	59	15	77	69	20	43
Winners	1,901	4,069	23,476	33,649	7,539	25,305	18,124	114,063

Notes: This table measures the delays between tender dates and the share of first awards without a reported value. Firms whose first procurement award falls between September 2019 and September 2025 (Austria from January 2021) and comes through a procedure with a call for competition, before the match to AnaCredit and the sample restrictions of the event study. One observation per winner and tender in the month of the first award; tenders without a call in that month are left out. The bid deadline is the deadline for submitting bids, the award decision the earliest award decision across the tender's lots, and the award notice the first publication of the contract award notice. Each row uses the tenders that report both of its dates; gaps below −30 or above 730 days are dropped. Awards found only through the TED search API (6% of the tenders) are left out, as that download has no bid deadline and dates an award either at the decision or at the award notice. The event study dates an award at the decision where it is reported, otherwise at the contract signature or the award notice. The first three panels give the days between the dates: the 25th percentile (p25), the median (p50) and the 75th percentile (p75). No award value is the share of winners without a positive award value in euro for any award in the month of the first award; placeholder values and values above twice the notice's total or above €5 billion count as missing. These winners are in the group Unknown or zero award of Table 8, Panel B. Winners counts the firms.

Table C.5: First awards of locked-in and not-locked-in winners

	Lock-in = 0	Cohort × country FE		
	mean	No RE capacity	Lock-in > 0	Share if > 0
Works: CPV 45 (pp)	38.30	-10.28***	-4.84***	-5.23*
		(1.40)	(1.53)	(2.75)
Services: CPV 50–98 (pp)	35.89	11.54***	4.59***	-0.81
		(1.48)	(1.63)	(3.04)
Log award value	12.49	-0.05	-0.07	-0.29**
		(0.07)	(0.08)	(0.14)
Two or more award notices (pp)	5.49	0.33	-0.03	0.23
		(0.67)	(0.73)	(1.32)
Award value unknown (pp)	52.33	3.24**	0.89	-1.31
		(1.42)	(1.53)	(2.60)
CPV divisions jointly (p-value)		0.000	0.855	0.156
Winner firm-cohorts	1,202	32,135	4,306	4,306

Notes: This table compares the first awards of winners by lock-in status. One observation per winner firm-cohort at event month −12. Lock-in = 0 mean is the mean of winners with real estate collateral and a lock-in share (4) of zero. No RE capacity and Lock-in > 0 are the coefficients on indicators for winners without real estate collateral and with a positive lock-in share, in one regression against this base. Share if > 0 is the coefficient on the lock-in share (0 to 1) among locked-in winners. Works are CPV division 45, services CPV divisions 50 to 98. Log award value is for awards with a known positive value. Two or more award notices counts the notices in the month of the first award. CPV divisions jointly is the p-value of an F-test in a regression of the column's lock-in variable on CPV-division indicators. Italian awards carry no CPV division, so the CPV rows are without Italy. The sample is all winners, every award size. Winner firm-cohorts counts each group. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.6: First awards of winners with excess collateral in the largest award tercile, by recharge group

	Winners with excess collateral			Recharge − non-recharge
	Non-recharge mean	Recharge mean	Normalised difference	cohort FE
Works: CPV 45 (pp)	42.55	38.06	-0.09	-4.50
				(7.09)
Services: CPV 50–98 (pp)	53.19	46.96	-0.12	-5.89
				(7.71)
Log award value	13.96	13.30	-0.45	-0.95***
				(0.15)
Two or more award notices (pp)	9.23	6.87	-0.09	-1.61
				(3.48)
CPV divisions jointly (p-value)				0.002
Winner firm-cohorts	130	495		

Notes: This table contrasts the first awards of winners with excess collateral in the largest award tercile between recharge and non-recharge countries. Winners with a positive lock-in share (4) (excess collateral) whose first award is in the top tercile of award size, the award's value over total assets at event month −12, within country; one observation per winner firm-cohort at event month −12. The first two columns are the means in the non-recharge countries (France, Italy) and the recharge countries (Austria, Belgium, Germany, Spain, the Netherlands); the normalised difference is the difference in means over $\sqrt{(s_R^2 + s_N^2)/2}$. The last column is the coefficient on a recharge-country indicator in a regression with cohort fixed effects; cohort × country fixed effects would absorb it. Rows as in Table C.5; every top-tercile award has a known value. CPV divisions jointly is the p-value of an F-test in a regression of the recharge indicator on CPV-division indicators with cohort fixed effects. Italian awards carry no CPV division, so the CPV rows compare France with the recharge countries. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.7: Balance of first-time winners and not-yet-winners at event month −12

	Procurement sample					All firms
	Treated mean	Control mean	Difference within cohort × country	Standard error	Normalised difference	Population mean
Log total assets	14.25	14.17	0.07***	(0.01)	0.05	13.65
Debt / assets (pp)	17.65	17.96	-0.10	(0.20)	-0.01	25.15
Secured debt / assets (pp)	6.22	6.25	-0.00	(0.12)	-0.00	11.75
Unsecured debt / assets (pp)	11.21	11.48	-0.11	(0.15)	-0.02	12.47
Secured share of debt (pp)	33.12	33.08	-0.06	(0.40)	0.00	42.90
Credit-line utilisation (pp)	65.49	64.77	0.32	(0.52)	0.02	73.99
Average interest rate (pp)	2.96	2.79	0.03	(0.02)	0.08	2.96
Reported PD (pp)	3.37	3.37	0.08	(0.09)	-0.00	4.02
Industry-weighted PD (pp)	2.66	2.70	0.01	(0.07)	-0.01	3.77
Number of banks	1.54	1.52	0.04***	(0.01)	0.02	1.17
Two or more banks (pp)	37.76	36.94	0.99**	(0.45)	0.02	23.74
Incumbent share of debt (pp)	84.40	84.67	-0.19	(0.22)	-0.01	89.83
Incumbent relationship (months)	29.05	26.57	-0.04	(0.15)	0.12	27.46
Lock-in share, firms with RE capacity (pp)	40.66	40.09	0.21	(0.68)	0.02	39.77
No RE capacity (pp)	85.37	84.71	0.32	(0.34)	0.02	78.73
Months since first loan record	35.37	32.05	0.11	(0.11)	0.16	32.23
Firm age (years)	20.67	20.30	0.26	(0.18)	0.02	17.37
Months to own first award		28.04				
Firm-cohorts	37,643	161,489				
Firm-months						161,529,747

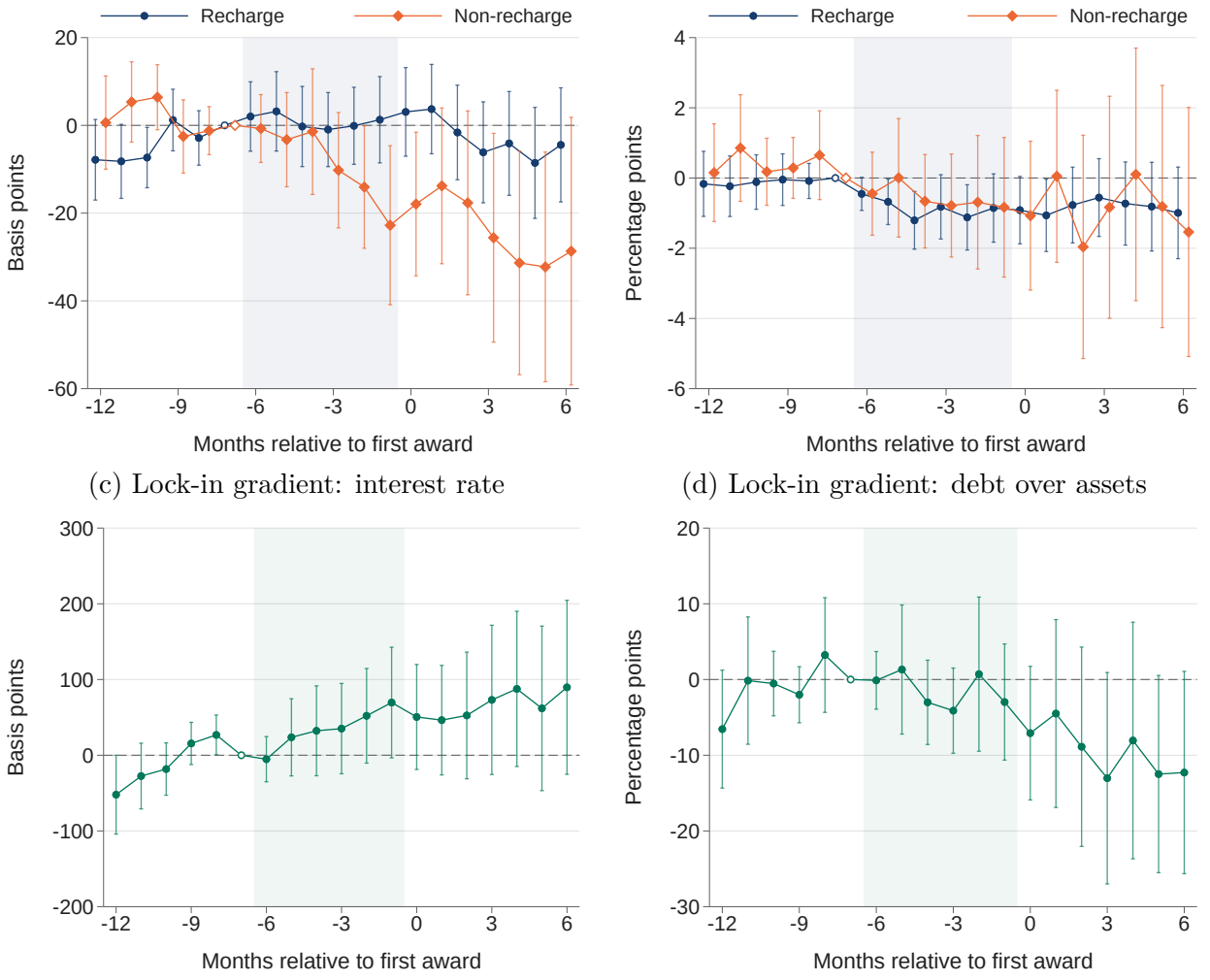
Notes: This table compares first-time winners with their matched not-yet-winners and with all firms a year before the award. First-time procurement winners (Treated) and their matched not-yet-winners (Control) at event month −12, pooled over the seven countries. The unit is a firm × cohort; a control firm can serve several cohorts. The within difference is the coefficient on Win_{ic} in a regression with cohort × country fixed effects; the normalised difference is the difference in means over $\sqrt{(s_T^2 + s_C^2)/2}$. The population mean covers all firm-months of the seven countries under the sample's restrictions (a loan record in the month, not in default, Austria from January 2020), with calendar months weighted by the sample's firm-cohorts. Compared to the population, procurement firms are larger, have less secured debt, lower utilisation of credit lines, and a lower usage of real estate, partly because of the sample's country composition. The rate is the amount-weighted average rate on outstanding debt. The incumbent is the bank with the largest drawn debt; relationship length is left-censored at the start of AnaCredit. The lock-in share is (4). Months to own first award is for controls that win after the event window. The rate and debt ratios are winsorised at the 1st and 99th percentiles, in the population at the sample's bounds. Standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.8: Balance of winners with excess collateral in the largest award tercile, by recharge group

	Recharge mean	Non-recharge mean	Difference within cohort	Standard error	Normalised difference
Log total assets	13.72	13.95	-0.48***	(0.12)	-0.20
Debt / assets (pp)	28.72	32.05	-0.23	(2.56)	-0.14
Secured debt / assets (pp)	20.19	19.43	1.55	(1.76)	0.05
Unsecured debt / assets (pp)	7.76	12.20	-2.67	(1.76)	-0.30
Secured share of debt (pp)	75.39	65.51	7.61**	(3.36)	0.31
Credit-line utilisation (pp)	57.89	77.96	-32.61***	(12.13)	-0.52
Average interest rate (pp)	3.37	3.25	-0.07	(0.20)	0.07
Reported PD (pp)	2.04	4.33	-0.76	(0.68)	-0.35
Industry-weighted PD (pp)	1.82	3.30	-0.25	(0.63)	-0.30
Number of banks	1.55	2.41	-0.96***	(0.17)	-0.62
Two or more banks (pp)	40.40	63.08	-24.53***	(5.50)	-0.46
Incumbent share of debt (pp)	88.25	76.67	12.86***	(2.45)	0.56
Incumbent relationship (months)	34.40	28.59	1.70	(1.43)	0.29
Lock-in share (pp)	48.42	59.83	-11.71***	(2.63)	-0.44
Months since first loan record	39.59	33.52	0.19	(0.84)	0.30
Firm age (years)	20.30	18.58	0.65	(1.78)	0.11
Winner firm-cohorts	495	130			

Notes: This table compares winners of the largest awards with excess collateral in recharge and non-recharge countries a year before the award. Within cohort, recharge winners are smaller, borrow from fewer banks, hold more of their debt with the incumbent, and have a lower lock-in share; their leverage, interest rate, default probability, and age do not differ significantly. Winners with a positive lock-in share (4) (excess collateral) at event month -12 whose first award is in the top tercile of award size within country: the sample of Table C.6 and the Winners with excess of Table 9. One observation per winner firm-cohort. The recharge countries are Austria, Belgium, Germany, Spain, and the Netherlands, the non-recharge countries France and Italy. The difference within cohort is the coefficient on a recharge-country indicator in a regression with cohort fixed effects; cohort $\times$ country fixed effects would absorb it. The normalised difference is the difference in means over $\sqrt{(s_R^2 + s_N^2)/2}$. The rate is the amount-weighted average rate on outstanding debt. The incumbent is the bank with the largest drawn debt; relationship length is left-censored at the start of AnaCredit. Each row uses the winners for which it is observed: credit-line utilisation is observed for 322 recharge and 12 non-recharge winners, reported PD for 201 and 116. The rate and debt ratios are winsorised at the 1st and 99th percentiles. Standard errors, clustered by firm. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

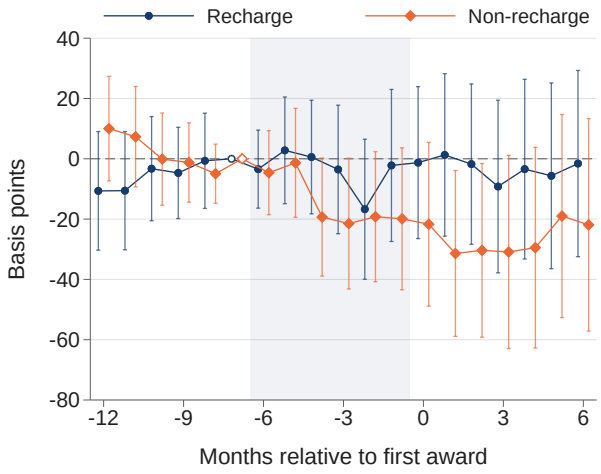
Figure C.2: Parallel trends of the largest awards: excess collateral and the lock-in gradient



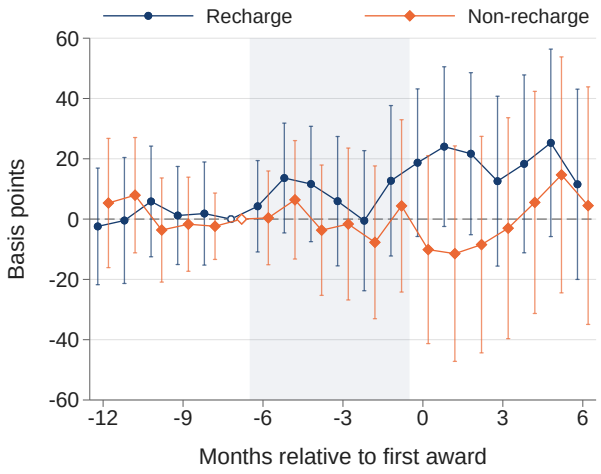
Notes: This figure plots the event-month paths behind Panels B and C of Table 9. Winners whose first award is in the top tercile of award size, the award's value over total assets at event month -12, within country, from the event-month versions of the regressions of Panel B (panels a and b) and Panel C (panels c and d) of Table 9. The recharge countries (Austria, Belgium, Germany, Spain, the Netherlands) and the non-recharge countries (France, Italy) are separate regressions. Panels (a) and (b) plot, for the recharge and the non-recharge countries, the winner effect of firms with real estate and a positive lock-in share $LS_{i,c-12}$ (4) at event month -12 (excess collateral) against the controls with excess collateral: the coefficient on $\mathbf{1}\{t-c=\tau\}\text{Win}_{ic}$ plus its interaction with the excess indicator. Panels (c) and (d) plot the recharge minus the non-recharge coefficient on $\mathbf{1}\{t-c=\tau\}\text{Win}_{ic} \times LS_{i,c-12}$, the winner effect per unit of lock-in share. The reference month is -7, the last month before the post window (hollow markers). The shaded area marks the anticipation window, months -6 to -1. The interest rate is the amount-weighted average rate on the firm's outstanding debt, in basis points; debt is total debt over total assets at event month -12, in percentage points; both are winsorised at the 1st and 99th percentiles. Fixed effects: firm $\times$ cohort and cohort $\times$ country $\times$ month. Bars are 95% confidence intervals; standard errors clustered by firm. The joint F test that the coefficients of months -12 to -8 are zero has $p = 0.05$ (recharge) and 0.25 (non-recharge) in (a), and 0.98 and 0.81 in (b); for the recharge minus non-recharge path, $p = 0.01$ in (a), 0.82 in (b), 0.008 in (c) and 0.09 in (d).

Figure C.3: Relationship length and the interest rate after the largest awards

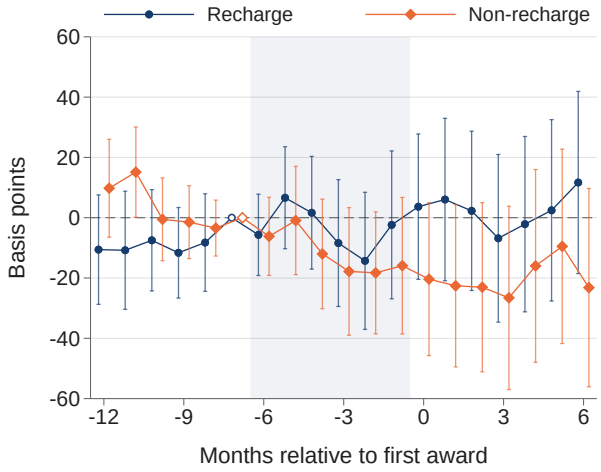
(a) Relationship of 13 to 36 months



(b) Over 36 months, started in AnaCredit



(c) Relationship before AnaCredit



Notes: This figure plots the event-study estimates of the information-levelling test of Table 10. Each panel plots event-month coefficients for winners whose first award is in the top tercile of award size, the award's value over total assets at event month -12, within country, from the event-month version of the regression of Table 10. The recharge countries (Austria, Belgium, Germany, Spain, the Netherlands) and the non-recharge countries (France, Italy) are separate regressions. Panels (a) to (c) plot the coefficients on $\mathbf{1}\{t-c=\tau\}\text{Win}_{ic}$ interacted with an indicator for a relationship with the incumbent, the firm's largest lender at event month -12, of 13 to 36 months (a), of more than 36 months that started in AnaCredit (b), and already present in its first month, September 2018, of unknown length (c): the path relative to top-tercile winners in relationships of up to 12 months. The regression has event-month interactions of the three relationship indicators and of an indicator for firms without drawn bank debt at event month -12, each also interacted with every winner group. The sample is the cohorts whose event month -12 is October 2021 or later. The reference month is -7, the last month before the post window (hollow markers). The shaded area marks the anticipation window, months -6 to -1. The interest rate is the amount-weighted average rate on the firm's outstanding debt, in basis points, winsorised at the 1st and 99th percentiles. Fixed effects: firm $\times$ cohort and cohort $\times$ country $\times$ month. Bars are 95% confidence intervals; standard errors clustered by firm. The joint F test that the coefficients of months -12 to -8 are zero has $p = 0.81$ (recharge) and 0.42 (non-recharge) in (a), 0.92 and 0.45 in (b), and 0.75 and 0.02 in (c).

Table C.9: Relationship length and the credit response to the largest awards

		Debt / assets					
	Rate (bp)	Total	Secured	Unsecured	Incumbent	Outside banks	PD
	Panel A: Non-recharge						
Win × Post	16.17	0.20	0.43	-0.08	-0.56	0.57	0.15
	(9.86)	(0.93)	(0.38)	(0.76)	(0.70)	(0.65)	(0.46)
× 13 to 36 months	-22.39*	0.03	0.14	-0.36	0.13	-0.06	-0.25
	(11.84)	(1.10)	(0.49)	(0.91)	(0.85)	(0.77)	(0.56)
× over 36 months in the data	-2.07	-0.40	0.21	-0.82	-0.09	-0.17	0.30
	(13.39)	(1.27)	(0.57)	(1.01)	(0.89)	(0.81)	(0.74)
× relationship before AnaCredit	-19.45*	0.53	-0.54	0.91	0.73	-0.33	-0.12
	(11.17)	(1.08)	(0.55)	(0.90)	(0.80)	(0.76)	(0.56)
Obs.	641,924	780,273	780,273	780,273	700,111	700,111	768,555
Winner firm-cohorts	7,961	8,619	8,619	8,619	7,766	7,766	8,799
Control firm-cohorts	29,992	32,453	32,453	32,453	29,085	29,085	33,089
	Panel B: Recharge						
Win × Post	-7.67	2.56**	0.90*	1.30	-0.10	2.11***	0.31
	(8.30)	(1.15)	(0.55)	(0.97)	(0.86)	(0.64)	(0.64)
× 13 to 36 months	1.63	-2.00	-1.10*	-0.67	0.11	-1.63**	0.29
	(10.19)	(1.35)	(0.63)	(1.12)	(1.01)	(0.74)	(0.74)
× over 36 months in the data	12.71	-1.90	-1.11*	-0.45	0.33	-1.49**	-0.10
	(10.09)	(1.28)	(0.62)	(1.08)	(0.98)	(0.72)	(0.75)
× relationship before AnaCredit	7.67	-2.36*	-1.12*	-0.93	-0.28	-1.60**	-0.35
	(9.64)	(1.23)	(0.59)	(1.04)	(0.92)	(0.69)	(0.68)
Obs.	801,314	1,117,695	1,117,695	1,117,695	921,803	921,803	528,321
Winner firm-cohorts	9,928	11,941	11,941	11,941	9,901	9,901	8,121
Control firm-cohorts	38,214	46,886	46,886	46,886	38,615	38,615	31,138
Firm × cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort × country × month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table extends Table 10 to the outcomes of Table 9. Winners whose first award is in the top tercile of award size within country, from the regression of Panel B of Table 8 estimated separately for the non-recharge countries (France, Italy; Panel A) and the recharge countries (Austria, Belgium, Germany, Spain, the Netherlands; Panel B). The regression adds Post_{ct} interacted with indicators for a relationship with the incumbent, the firm's largest lender at event month −12, of 13 to 36 months, of more than 36 months that started in AnaCredit, and already present in its first month (September 2018, of unknown length), and with an indicator for firms without drawn bank debt at event month −12, each also interacted with every winner group. Relationship length is counted from the pair's first month with drawn debt in AnaCredit. $\text{Win}_{ic} \times \text{Post}_{ct}$ is the post-award change for top-tercile winners in relationships of up to 12 months; the three rows below are the additional change in longer relationships. Post_{ct} covers event months −6 to +6 against −12 to −7. The sample is the cohorts whose event month −12 is October 2021 or later, so that every relationship that started before AnaCredit is older than 36 months. The rate is the amount-weighted average interest rate on outstanding debt. The debt columns are over total assets at event month −12. Incumbent is debt with the incumbent and Outside banks debt with the firm's other banks; both columns cover only firms with drawn bank debt at event month −12. PD is the bank-reported default probability. Winners and Control firm-cohorts count all winners and controls of each column's sample, every award tercile. Fixed effects: firm × cohort and cohort × country × month. All outcomes are winsorised at the 1st and 99th percentiles. Rate in basis points, all other columns in percentage points; standard errors, clustered by firm, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.