Insiders v. Outsiders: 
Market Creditor Protection, 
Finance and Investment†

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Abstract

Market-based lending plays a key role in credit intermediation. But protection of dispersed market creditors’ rights disciplines firm governance at the expense of debt restructuring efficiency. In theory, stronger protection has an ambiguous but possibly sizable effect on firms’ financing and investment. I estimate effects of a US court ruling which protected bondholders against coercive exchange offers: After the ruling, distressed firms were forced to restructure bond debt in bankruptcy more frequently, which led healthy firms cut issuance and investment. The direction and magnitude of effects emphasizes the importance of coordination frictions above moral hazard concerns.

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1 Introduction

In the classical approach to financial intermediation, businesses concentrate their debt in the hands of a few creditors and establish lending relationships (Diamond, 1984). Such relationships, however, are known for their risk to burden firms economically (Rajan, 1992; Bolton and Scharfstein, 1996; Boot, 2000; Schwert, 2020). As an alternative, firms may issue standardized debt securities in public capital markets, where many investors buy and sell small positions to enjoy portfolio diversification and liquidity on an individual basis. While such market-based lending avoids agency frictions of lending relationships, it fragments the creditor base.

Creditor dispersion is costly to every firm that faces default risk: When debt may need restructuring, coordination frictions among dispersed market creditors impose two burdens. Firstly, their collective action problem creates a temptation to hold out of agreements and free-ride on others’ concessions (Gertner and Scharfstein, 1991). This can frustrate private debt restructuring and require costly court interventions. Secondly, debt restructurings may redistribute value from poorly-coordinated market creditors to a well-organized insider coalition of the debtor and relationship lenders (Brudney, 1992; Baird, 2023). Debtors and monitoring relationship lenders who anticipate such ex-post redistribution, may care less to avoid distress in the first place, i.e., suffer ex-ante moral hazard.

In this paper, I highlight that the legal protection of market creditors trades-off both burdens. On the one hand, strong protection restrains the ability of insider coalitions to restructure liabilities at the expense of dispersed market creditors (Brudney, 1992). On the other hand, coordination frictions among dispersed market creditors will complicate debt restructuring only if they command important legal rights. That is, weak protection allows to overcome hold-outs more easily and implement desirable restructuring solutions against their dissent (Roe, 1987). Taken together, stronger market creditor rights may limit ex-ante moral hazard—but risk complicating distress resolution ex post. Which of the two effects dominates economic reactions is an empirical question and answers may depend on the context. For the US, I find a recent expansion of bond market creditor rights to have doubled the propensity to restructure bonds under costly court procedures and pushed healthy firms to cut bond issuance and investment by a substantial margin.

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1 Lending relationships can impair management incentives ex-ante—and thus firm value—due to hold-up power in good states and soft-budget-constraint problems in distress (Rajan, 1992; Bolton and Scharfstein, 1996). By contrast, arm’s-length debt not only eschews the soft-budget-constraint problem but can mitigate it for senior relationship debt by serving as a buffer (Boot, 2000; Park, 2000; Rauh and Sufi, 2010). Moreover, relationship creditors’ monitoring costs can be excessive i) in the sense of swamping the expected value of liquidity services in distress (Bolton and Freixas, 2000; Bolton et al., 2016) or ii) when creditors cannot benefit from upside potential (Besanko and Kanatas, 1993).

2 Market-based lending can also create positive macroeconomic externalities. Easing diversification on the lender’s side, it reduces the probability of zombie credit (Hoshi and Kashyap, 2004; Caballero et al., 2008), acts as “spare tire” for financial intermediation during banking crises (Greenspan, 1999; Becker and Ivashina, 2014) and offers an effective lever for unconventional monetary policy (Boyarchenko et al., 2022).
I start with a model to clarify and illustrate the opposing economic channels of market creditor protection. It is grounded in the assumption that market creditors cannot contract on firm governance quality.\(^3\) This associates market-based borrowing with a moral hazard problem: To the extent firm owners and relationship creditors can expect to rid the firm of market debt in financially dire circumstances, their will spend less resources on management and monitoring to avoid it. To zoom in on this very conflict, the model groups firm owners, relationship creditors and the managers they appoint and interfere with under the label of firm “insiders”.\(^4\) Anticipating insider moral hazard, market creditors will guard themselves by demanding higher yields ex-ante, effectively shift moral hazard costs back onto insiders and discourage bond issuance in the first place. Insofar as insider finance and market debt are imperfect substitutes—modeled as wedge between insider and market discount rates—financing costs rise and undermine real investment. Protecting market creditors from coercive debt exchange offers limits the ability to shed market debt in distress and thus reduces the cost of moral hazard embodied in yields. However, such protection pushes firms into costly bankruptcy, when severe distress would actually require strong coercion to facilitate efficient out-of-court restructuring.\(^5\) Calibrating the model to key empirical moments indicates that the net effect can be sizable but may be both positive or negative.

I test the economic repercussions of market creditor rights using a landmark US court ruling bolstering bondholder protection in 2014 (Court of the Southern District of New York, 2014). The court broadened the interpretation of existing law to restrain bond exchange offers using exit consents, a legal strategy commonly used to sanction hold-outs but also accused to force poorly-coordinated bondholders into accepting unfavorable terms. The verdict surprised practitioners as well as legal scholars, was motivated by legislative history rather than economic considerations and set an important precedent for subsequent cases to draw upon.\(^6\) To estimate the effect of this macro-level regime shift, I rely on differential firm-level exposure.

As a first step, I present evidence indicating that distressed firms are significantly more inclined to seek court-based restructuring after the Marblegate ruling. This results is driven by firms with above-median level of bond debt relative to book assets—henceforth referred to as bond-intensive—while other firms

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3. Market creditors barely monitor management. Neither do they monitor the way in which relationship creditors exercise control upon covenant violations outside of distress (Chava and Roberts, 2008; Roberts and Sufi, 2009; Nini et al., 2012; Roberts, 2015; Arnold and Westermann, 2023). That is, even if market creditors were to include provisions in their lending contracts on how management ought to act or in inter-creditor agreements on how relationship lenders ought to exercise controls, they could not effectively enforce them.

4. Monitoring relationship creditors influence debtor management (Chava and Roberts, 2008; Roberts and Sufi, 2009; Nini et al., 2012; Roberts, 2015; Arnold and Westermann, 2023). That is, firm governance is co-determined by owners and relationship creditors. To capture frictions between owners and relationship creditors (cf., Bergman and Callen, 1991; Aghion and Bolton, 1992; Rajan, 1992; Hart, 1995), the model subjects insiders’ group-level behavior to an elevated discount rate: Equity and relationship credit carry extra opportunity cost—rooted in agency frictions—which incentivize bond issuance in the first place.

5. In the model, the deadweight cost of bankruptcy is an implicit cost of market-based borrowing and born by both insiders and market creditors. Thus, yields reflect it only partially.

6. In fact, litigation related to the multi-billion USD bankruptcy of Caesars casino conglomerate drew upon the Marblegate verdict soon after.
barely change their filing behavior. This aligns with the prediction of numerous commentators who, at the time, anticipated that "Marblegate would empower hold-out creditors, thus reduce chances to restructure bond debt outside of a court and force affected firms into a formal bankruptcy procedure. The effect I estimate is quantitatively large: among the quartile of bond-intensive firms with the highest levels of financial distress, bankruptcy filing rates essentially doubled. For out-of-court bond restructurings, I document that "Marblegate resulted in higher bond recoveries in the exchanges that still did occur, compared to what bondholders received in similar cases before, and document evidence consistent with more frequent hold-outs. Taken together, this evidence is consistent with the ex-post distress cost channel of market creditor protection.

If "Marblegate reduced ex-ante moral hazard costs by more than it increased expected deadweight losses from distress, healthy firms would nevertheless want increase bond issuance and ramp up investment in response to cheaper financing. Given difficulties of measuring moral hazard in this context, I directly test the overall reaction of healthy businesses. I use that firms with low default risk or little reliance on bond finance will barely have reacted to "Marblegate, and thus comprise a useful control group for any reaction among risky, bond-intensive peers. Running corresponding difference-in-differences regressions, I find that firms that were risky and bond-intensive in the quarter before the ruling cut their investment rates by about 20% relative to peers that are less bond-reliant. These reductions in investment spending are not driven by a precautionary motive: they do not mirror accumulation of cash or liquid assets. Instead, they mirror a reduction in net debt issuance. Zooming in on bond issuance activity, I find the quarterly probability to place a substantive bond issue to be reduced from about 6% to only 1%.

Results described in the previous paragraph are estimated in the sample of risky firms. Running the sample specifications for the placebo sample of safe firms—who should care much less about institutional features of distress resolution such as "Marblegate—I find no reaction in investment nor in bond issuance. Bond intensity as well as risk are chosen or at least influenced by management. I measure both features before "Marblegate to avoid endogenous selection in response to the ruling. Nevertheless, effects could still be driven by confounding features that co-determine i) bond-intensity and risk together with ii) the time profile of investment and debt issuance for reasons unrelated to "Marblegate. To mitigate concerns of such type, I deploy an alternative identification approach using firm-quarter-specific events that does neither rely on a firm’s bond intensity nor its default risk rating. Specifically, I estimate the reaction of firms to relationship lender balance sheet shocks and compare those before with those after "Marblegate. Consistent with previous literature, I show that such shocks increase borrower’s propensity to substitute away and increase bond issuance. Importantly however, I find that this propensity almost collapses for shocks hitting after "Marblegate, supporting the notion that it made firms considerably more reluctant to issue bonds.

Overall, my results suggests that stronger bondholder rights elevated the ex-post distress cost of bond

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7 Using the universe of US insurer bond holdings data, I confirm a given firm can expect to face wider bondholder dispersion when it increases the volume of outstanding bonds.
finance by more than they reduced the cost of ex-ante moral hazard in the prevailing US context. Considering that the verdict was a mere re-interpretation of existing law, as opposed to a full-blown legal reform, the economic magnitude of effects on investment and bond issuance appear especially sizable. However, the theory predicts that these effects are context-dependent and could vary across countries and time.

Other related literature My analysis builds on a mature literature highlighting the role of incomplete contracts and legal institutions for corporate financial distress and bridges the largely independent literatures on creditor rights and corporate debt structure.

Market debt’s coordination frictions matter because financial contracts are incomplete to start with: re-negotiation is an integral mechanism for adapting to uncovered contingencies (Hart, 1995). While the coordination of financial relationships through adequate design of credit or inter-creditor agreements employs a considerable industry of corporate lawyers and investment bankers, the practical costs of contracting and contract enforcement still extort the reliance on imperfect control rights to handle the complexity of socio-economic reality (Aghion and Bolton, 1992). These contracting frictions capacitate the law to create (or undermine) economic value.

By complementing and constricting private contracts, the legislator shapes financial intermediation (La Porta et al., 1997, 1998) and, in turn, the real economy. Legal institutions are particularly consequential when contract incompleteness and the need for re-negotiation tends to be most acute: when the borrower becomes financially distressed. The efficiency of bankruptcy law exercises considerable influence over the size of credit markets in general, and bond markets in particular (Djankov et al., 2008; Becker and Josephson, 2016). My analysis points to the need for regulating out-of-court restructurings—and the inherent challenge to do so effectively while still avoiding costly judicial verification most of the time. By emphasizing obstacles to private restructuring being responsible for pushing firms into bankruptcy, I complement Donaldson et al. (2022), who highlight, conversely, that more efficient bankruptcy could crowd-in private restructuring. Moreover, I shed light onto the repercussions of redistributing value across creditor groups.

A large literature has analyzed how the protection of creditor rights against the interest of borrowers drives the supply of credit, the value of collateral and firms’ incentive to lever up, take business risk and innovate (Djankov et al., 2007; Davydenko and Franks, 2008; Haselmann et al., 2009; Acharya and Subramanian, 2009; Acharya et al., 2011; Vig, 2013; Gennaioli and Rossi, 2013; Favara et al., 2017; Closset and Urban, 2019). An equally intense conflict rages between creditors (Welch, 1997; Bris et al., 2006; Berglöf et al., 2010; Baird, 2023). My analysis acknowledges the importance of creditor-creditor conflict, not only for ex-post but also ex-ante outcomes, emphasizing the collective action problem that better organized parties can exploit to their own benefit.

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8This power, of course, is conditional on effective judicial enforcement (e.g., Alencar and Ponticelli, 2016).

9The economic implications of costly distress resolution can be sizable also for the macroeconomic cycle (see, for example, Jordà et al., 2022; Becker and Ivashina, 2022; Ma and Kornejew, 2022).
Recent cross-country studies suggest that stronger creditor rights encourage debt structure concentration across countries (Goyal et al., 2019; John et al., 2021), but lacks conclusive evidence on channels and real effects. I document that well-protected market creditors can encumber distress resolution, highlighting a specific mechanism consistent with the cross-country findings. In this sense, the common assumption of financially inflexible market debt in corporate finance and the macro-finance literature (e.g., Bolton and Scharfstein, 1996; Bolton and Freixas, 2000; Boot, 2000; Hackbarth et al., 2007; Berglöf et al., 2010; Crouzet, 2018) is actually subject to legal design. Importantly, I document real effects beyond a mere re-composition of financial structure which likely operate through a change in effective corporate discount rates (cf. Gormsen and Huber, 2023).

While relationship creditors tend to be senior to market creditors for various reasons (Welch, 1997; Gennaioli and Rossi, 2013), my focus does center the long-standing debate over merits and caveats of absolute priority, i.e., strictly honoring the claims’ seniority ranking (see Schwartz, 1994; Baird, 2017). Instead, I emphasize market creditors’ double-sided ex post conflict, who often face an insider coalition of both senior creditors as well as junior equity. Secondly, the rift between relationship and market creditors might well run through the middle of a creditor class with equal priority: Banks or hedge funds might hold a large portion of bonds within the same issue, combining capacity and incentive to monitor the issuer—in contrast to a large number of pension funds, foreign and retail investors, each holding a small fraction of the remaining bond volume and reliant on public information.

The terms arm’s-length creditor and market creditor are often used interchangeably because capital market-based lending is typically transactional in nature and reliant on public information. One must not forget the conceptual difference, however. A growing literature highlights how relationships can arise in corporate bond markets (Di Maggio et al., 2017; Zhu, 2021; Nagler and Ottonello, 2023). Conversely, coordination frictions also arise with multiple banking (Brunner and Krahnen, 2008; Bellon et al., 2022)—albeit loan syndicates tend to concentrate control rights in the hands of few relationship lenders who monitor and renegotiate on behalf of the entire syndicate (Berlin et al., 2020). Taken together, this line of research illustrates that neither arm’s-length nor relationship lending is tied to specific financial organizations or security classes and that the dichotomy of relationship and arm’s-length lending may be more realistically conceptualized as a spectrum of hybrid approaches. My results are consistent with the view that market-based lending feature “weaker” relationships on average than other forms of debt finance.

Finally, my analysis concerns large firms, who borrow from the market more often and typically face some form of creditor dispersion. A growing body of evidence links the prevalence of large firms to economic development (Bento and Restuccia, 2017; Kwon et al., 2022; Chen, 2022), pointing to the potential—and challenge—of realizing returns so scale. My results suggests that well-calibrated market creditor rights can enhance governance and harness the growth potential coming with large firms.

**Structure** The paper proceeds with a description of the institutional background and a theory in Section 2. Section 3 presents empirical results; describing the court ruling, data sources and discussing empirical identification strategy and findings. Section 4 concludes.
2 Market debt restructuring

I focus on the corporate bond market, which intermediates the lion’s share of capital market-based business credit in the US. The theory presented in Subsection 2.2 applies to any form of market credit.

2.1 Institutional background

Almost half of all US corporate restructurings occur outside the courts (Gilson et al., 1990; Asquith et al., 1994; Moody’s, 2020), which is desirable in terms of ex-post efficiency. Legal and consulting fees are larger in formal court procedures and total between 1% and 10% of firm asset value (Hotchkiss et al., 2008; Lubben, 2012). In addition, bankruptcy filings can inflict sizable indirect costs: It highlights risks to a wide array of stakeholders usually not monitoring firm financials closely, including suppliers, customers and (prospective) employees. Upon receiving such a signal, these stakeholders will re-consider relationship-specific investments and disrupt operations by withholding trade credit, switch products or look for employers with better job stability (Sautner and Vladimirov, 2017; Antill and Hunter, 2021; Elias, 2023).\(^\text{10}\) Distracted management, anxious for their positions and trying to shore up the company for deeper scrutiny in bankruptcy, may further undermine profits. These indirect costs are specific to bankruptcy, and existing empirical evidence suggests that they are large, devouring up to 20% of the firm’s going-concern value (Hotchkiss et al., 2008; Epaulard and Zapha, 2022).

However, with a large number of claimants, out-of-court negotiations are subject to major frictions. The coordination and supervision of creditors afforded by an orderly and meticulous procedure in court has traditionally been considered to justify and outweigh its costs (Jackson and Scott, 1989; Gilson et al., 1990). Gilson et al. (1990) and Asquith et al. (1994) were among the first to systematically document how debt structure affects the mode of distress resolution. Notably, restructuring dispersedly held bond debt is generally inhibited by investors’ incentive to hold out of debt exchange offers, i.e., refusing to exchange and free-ride on the concessions of others, whose debt hair-cuts re-established borrower solvency (s.f., Gertner and Scharfstein, 1991; Asquith et al., 1994). This problem is pronounced in the United States by the Trust Indenture Act (TIA), a cornerstone of US securities law. Section 316(b) prohibits amendments of “core payment terms”—principal, coupon structure and maturity date—by majority vote. The law was an element of the 1930s New Deal legislation, motivated by irregularities in corporate bond restructurings during the Great Depression as described by the newly formed US Securities and Exchange Commission (SEC) in their investigation into the “Work, Activities, Personnel and Functions of Protective Reorganization Committees” during the Great Depression (Roe, 1987; Brudney, 1992). The multi-volume report took several years to finish and the first part on claimed (Securities and Exchange Commission, 1937, Part I, p. 243):

> “The inside group—namely, the management, the bankers, or the two together, as the

\(^{10}\)For example, (Bucola and Bornstein, 2023) highlight that suppliers’ trade credit is one of the most important form of short-term financing in the economy.
case may be—is in control of the company on the eve of reorganization. It therefore starts with certain definite advantages over any other group. Accepted reorganization practices provide numerous means and devices which enable this group to maintain and further these advantages.”

The Trust Indenture Act of 1939 grants individual bondholders extensive rights to refuse impairment of principal value, coupon or extension of maturity even if a majority of bondholders would agree to change the indenture accordingly. Thus, for decades to come, it was commonly accepted that dispersed market debt could be restructured only with the powers and supervision of a bankruptcy court.\textsuperscript{11} From the late 1980s onwards, however, professional distressed-debt investors started to play an increasingly prominent role in the riskiest segments of the (secondary) bond and loan markets (Altman, 2014). These institutions—hedge funds, investment banks and private equity funds—specialized in forecasting economic potential and capital structure dynamics of distressed firms. Accumulating debt stakes via capital markets rendered such screening worthwhile and allowed them strike insider deals in a debt restructuring. Meanwhile, they overturned the traditional view that distress with substantial bond debt could only be resolved in-court: Firstly, stronger concentration of debt and repeated interactions between distressed-debt investors relaxed negotiations frictions that prevented out-of-court resolutions before (Buccola, 2019; Hotchkiss et al., 2021). Secondly, and importantly for my analysis, professional distressed debt investors were inventive in restructuring remaining dispersed bond debt using coercive forms of bond exchange or tender offers—so-called \textit{exit-consents} (Bratton and Levitin, 2018).

Exit-consents can discourage hold-outs despite strong rights of individual bondholders rooted in the TIA. Avoiding to directly vote on the bonds’ value, they link a bond exchange to a vote over covenants of its indenture, i.e., amending the financial contract governing the bond issue. Bondholders can \textit{exit}—and receive cash or new securities in exchange—if they \textit{consent} to stripping the legacy bonds off certain protections. Effective covenant targets leverage the interplay between bond indenture and the firm’s financial structure. One variant is to remove a parent guarantee when bonds are owed by a subsidiary with little assets. Another is to amend the indenture to subordinate the old bonds to the newly exchanged securities (incentives under this version are analysed in detail by Gertner and Scharfstein, 1991). Typically, exchanges are conditional on a minimum participation rate to ensure that collected votes satisfy the indentures majority requirements to legally remove the targeted covenant. Upon indenture amendment, remaining hold-outs are left with nominally unimpaired claims—in line with the TIA—but with less rights to actually enforce them. This discourages opportunistic hold-out strategies. But it also compels a poorly-coordinated pool of bondholders to accept whatever is marginally better than the hold-out recovery—which may be poor. Thus, the legal limits on exit-consent hold-out coercion have a first-order impact on out-of-court recoveries for dispersed bondholders.\textsuperscript{12}

\textsuperscript{11}In fact, this was one of the original objectives pursued by the act’s architects (see Baird, 2023).

\textsuperscript{12}Out-of-court renegotiations take place ‘under the shadow of the bankruptcy code’, i.e., are framed by the outside option of resolving distress in court. Thus, parties effectively bargain over how to share the value saved by sparing the cost of bankruptcy.
2.2 The economic effects of market creditor rights

I develop a model clarifying how market creditor rights can affect a firm’s financing, governance and investment policy. It illustrates the following points:

1. Out-of-court market creditor protection can improve corporate governance but also raise the cost of financial distress by pushing firms into bankruptcy.

2. The sign of the net effect on market borrowing and real investment is ambiguous.

3. The net effect on market borrowing and real investment is sizable under plausible calibrations.

Main mechanism Firms can offer market creditors to exchange their securities at any time. Due to coordination failure, dispersed market creditors may fail to refuse a (coercive) debt exchange offer as long as it leaves them no worse off than bankruptcy would—for which they can file individually, and thus unaffected by coordination frictions. This carries two implications. Firstly, debt exchanges will only occur when market debt would actually be impaired in bankruptcy. Secondly, exchange offers can extract rents from market creditors as large as the dead-weight costs of bankruptcy. These rents increase the pie available to relationship creditors and equity owners. To zoom in on this very conflict, I group firm owners, relationship creditors and the managers they appoint and interfere with under the single label of firm “insiders”—i.e., the group comprising all agents possessing important control rights

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13Coercive bond exchanges can force higher hair-cuts onto hold-outs if some majority of bondholders participates (Gertner and Scharfstein, 1991). If coordination frictions prevent a majority from jointly refusing the offer, each and every bondholder will find it weakly dominant to participate as long as the value of participation above the value of holding out individually. Then, in equilibrium, debtors may set the pay-off for participating bondholders just right above the hold-out value—in principle entirely independent of the actual going concern of the firm. Whenever bondholder can file for bankruptcy individually, the hold-out value may not be smaller than the bondholder's bankruptcy pay-off.

14Abstracting from exchanges that update bond terms as market conditions improve.

15In the US, any claimant can essentially file for bankruptcy individually such that any out-of-court resolution occurs "under the shadow of bankruptcy". Effectively, each party must receive at least its bankruptcy payoff and the only value to be bargained over is the dead-weight cost of bankruptcy saved in a private out-of-court restructuring. If market creditor coordination frictions are severe and very coercive bond exchanges are permissive, such exchanges can extract the entire extra value of avoiding a formal bankruptcy procedure.

16Firms cannot commit to forgo rents in bond restructuring because of contract incompleteness. Arm’s-length creditors face prohibitive coordination (and information) frictions to tailor contracts to evolving circumstances. Inevitably, contractual loopholes and blind spots emerge, allowing debtors and relationship creditors to undermine and hollow-out any such protective provisions written into financial contracts ex-ante.

17A qualitatively similar mechanic emerges when assuming that bondholder have inferior information about the going concern value, i.e., the pie to be split during debt renegotiations. Appendix II presents a model clarifying how rent extraction may purely be based on information asymmetries. (Morris and Shin, 2004) highlight that better information does not generally reduce the risk of coordination failure, however.
Market debt exchange rents make financial distress less dreadful for firm insiders. This creates moral hazard because market creditors do not monitor, and hence cannot effectively contract over, the governance of firm insiders. Instead, market creditors will guard themselves through higher rates ex-ante, making also investment success—where debt obligations can be honoured in full—less attractive. Both forces dis-incentivise firm insiders to implement costly management and monitoring measures that would increase the likelihood of business success.

The law defines the permissible set of exchange offers. Extensive out-of-court protection—tolerating nothing but a narrow set of transactions involving minor market debt impairment—will curtail insider rent extraction. This improves their incentives to keep the firm’s profitability high (cf., Bolton and Scharfstein, 1996), i.e., constituting the commitment device needed to reign in on moral hazard in a way private incomplete contracts with dispersed market creditors cannot deliver. At the same time, heavily distressed firms may be forced into bankruptcy as legal constraints on exchange offers prevent necessary bond hair-cuts to be be effectuated out-of-court. That is, at the margin, our-of-court bondholder protection ought to balance ex-ante commitment gains with ex-post distress costs associated to market finance.

Model horizon In a finite (two or three) period model, the firm’s going concern value cannot be endogenised. This is an important caveat because the going concern value i) affects firm policy and distress resolution and ii) changes with market creditor rights to the extent they affect firm behaviour. Hence, quantitative assessment of how market rights influence firm outcomes will be more reliable if based on an infinite-horizon model that fully endogenises—and hence captures the channel running through—the firm’s going concern value.

2.2.1 Model assumptions

In every period $t$, insiders choose the scale of operations $K_t \geq 0$ through investment or divestment,

$$k(K_{t-1}, K_t) = K_t - (1 - \delta)K_{t-1}$$

18 A large literature has analysed a wide array of important agency and information frictions within the group of insiders, shown how they matter for corporate governance along various dimensions. The mechanisms I study here does not rely on any single specific friction, but only on the fact that frictions of insider finance encourages the use of arm’s-length (i.e., outside) financing. Hence, I will capture the entirety of frictions within the group of insiders through an elevation of the discount rate that governs their group-level behaviour: A insider discount rate is synonyms with higher opportunity cost of insider funds and thus induces the incentive to issue bonds in the first place. The key advantage of this approach is to be agnostic about and abstract from the exact interaction between insiders. However, potential interaction between specific insider frictions and market creditor rights calls for further research.

19 Since the vast majority of fresh corporate financing is sources via credit markets—equity issuance covers less than 10% of financing needs according to data of Erel et al. (2012)—the distinction between insider and market finance may be thought of more directly as the distinction between relationship and market-based lending.

20 $K_t$ is to be interpreted as the book value of assets.
divesting subject to fire sale prices depending on market depth $\theta > 0$ \(^{21}\)
\[
\frac{\theta - k_t k_t (k_t \geq 0)}{\theta - k_t} = \begin{cases} 
\frac{\theta}{\theta - k_t} \in [0, 1) & \text{if } k_t < 0 \\
1 & \text{else} 
\end{cases}
\]
(2)
and generating operating profits in the next period $t + 1$ subject to decreasing economies of scale $\alpha \in (0, 1)$. \(^{22}\)
\[
a_{t+1} K_t^\alpha.
\]
(3)
Operative profitability $a_{t+1} \in \mathbb{R}$ is unknown at time $t$. All agents rationally expect $a > 0$ with probability $p(a_t, M_t)$ and a less fortunate outcome $a < \bar{a}$ with the complementary probability $1 - p(\cdot)$. \(^{23}\) Probability $p(\cdot)$ depends on firm insiders’ management and monitoring expenses $M_t \geq 0$, effectiveness of which may differ across states $a_t$. I assume that i) success probability strictly increases with management and monitoring expenses while ii) certain success is infinitely costly:
\[
M_1^t > M_2^t \iff p(a_t, M_1^t) > p(a_t, M_2^t),
\]
(4)
\[
M_t \to \infty \iff p(a_t, M_t) \to 1.
\]
(5)
Specifically, I stipulate the following functional form for the probability of success $p(\cdot)$, conforming with conditions (4) and (5):
\[
p(a_t, M_t) = \pi + (1 - \pi) \frac{M_t}{\gamma(a_t) + M_t}
\]
with $\gamma(a_t) = \begin{cases} 
\gamma & a_t = a \\
\bar{\gamma} & a_t = \bar{a} 
\end{cases}$
(6)
where $\pi \in [0, 1)$ determines the overall (ir-) relevance of management and monitoring while $\gamma > 0$ and $\bar{\gamma} < 0$ govern its marginal effectiveness in each state.
To fund capital expenses, insiders can issue market bonds at each point in time $t$ for unit price $P(\cdot)$ promising market creditors to pay $B_t > 0$ at $t + 1$. Actual repayment $\tilde{B}(\cdot)$ depends on whether the realised state warrants debt restructuring. \(^{24}\) Thus, the price that market bonds fetch at issuance depends on expectations about next periods actual repayment. While scale of operations $K_t$ and market debt issuance $B_t$ are easy to verify and contract upon, market creditors cannot effectively monitor insider governance quality $M_t$. Instead, they anticipate insiders’ optimal policy based on the observed state and the contracted choice, i.e., $M^*(K_{t-1}, B_{t-1}, a_t, K_t, B_t)$. \(^{25}\) Market bonds will thus be priced according

\(^{21}\)Incomplete depreciation generates realistic steady-state investment rates. Asset sale discounts capture asset specificity.

\(^{22}\)Operating profits are sales and other income less operating expenses, including wage bill and material costs but excluding capital maintenance expenses. Stronger curvature implies higher long-term profitability, and hence models degree and dynamics of competition (Hennessey and Whited, 2005).

\(^{23}\)Operating profitability might be negative, i.e., $a < 0$ is permissible.

\(^{24}\)Restructuring outcomes depend on—and thus will be explained after—the firm’s value function.

\(^{25}\)Market creditors effectively know the equilibrium effort choice, but they cannot commit insiders to choose a possibly value-enhancing higher effort level if that would give insiders the incentive to deviate after issuance.
$P(\cdot) = P(E[\hat{B}(K_t, B_t, a_{t+1})], M^*(\cdot))$. Market creditors are risk-neutral, in perfect competition and willing to lend without limit as long as they can expect to cover their opportunity cost of funds $\rho_b$.

Insiders cover any remaining financing needs themselves, e.g., think of credit lines, term loans or equity. In return, they extract free cash-flow in future periods, e.g., dividends and loan repayment. Importantly, insiders discount future value at the exogenous rate $\rho_i > \rho_b$. This captures opportunity costs elevated above the market discount rate through obstacles specific to insider funding: agency and information frictions associated to relationship lending (e.g., Rajan, 1992; Bolton and Scharfstein, 1996; Schwert, 2020) and equity issuance (e.g., Myers and Majluf, 1984), but also limited owner wealth and bank balance sheet constraints. This is a stark simplification. But it might be the most elegant way to summarise such a complex incentive ecology without emphasising a selected mechanism. Ultimately, insiders seek to balance cost of insider finance against the cost of restructuring distressed bond debt (see Bolton and Scharfstein, 1996; Crouzet, 2018).

Risk-neutral insiders maximise their expected discounted payouts by selecting scale of operation, bond issuance, and corporate governance $(K_t, B_t, M_t)$ conditional on past investments, legacy bond debt as well as current profitability $(K_{t-1}, B_{t-1}, a_t)$ with initial conditions $K_{-1} = B_{-1} = 0$. Insiders will file for bankruptcy and receive $V_C(\cdot)$ in court if operating the firm carries a lower (expected) value. Taken together, the insiders’ value function $V(\cdot)$ satisfies the following Bellman equation:

$$V(K_{t-1}, B_{t-1}, a_t) = \max \left\{ \begin{array}{l} V_C(K_{t-1}, a_t), \\ \max_{K_t, B_t, M_t} \left( a_t K_{t-1}^\alpha - k(K_{t-1}, K_t) \frac{\theta - k(1(k \geq 0))}{\theta - k} - M_t \\ - \hat{B}(K_{t-1}, B_{t-1}, a_t) + P(a_t, K_t, B_t, M_t^*) B_t \\ + \frac{1}{\rho_i} \left[ p(a_t, M_t) V(K_t, B_t, a) \\ + \left( 1 - p(a_t, M_t) \right) V(K_t, B_t, a) \right] \right) \right\}$$

In bankruptcy, the (going concern) value of the firm is $V(K_{t-1}, 0, a_t)$. This value is always non-negative and nests the option to liquidate $(K_t = 0 \forall t)$. I assume that the bankruptcy process devours fraction

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26 Further details are presented later alongside assumptions on restructuring and bankruptcy.

27 Insiders may re-negotiate their contractual relationships at any time, e.g., allowing banks to accommodate distressed firms or squeeze profitable ones.

28 In the background, I assume insiders to optimally compose equity and relationship lending in a way that balances issuance cost and information frictions in equity finance with elevated intermediation and monitoring cost, hold-up and soft-budget-constraint problems associated with relationship credit. Ultimately, these costs force the firm to forgo investments that would have a positive net present value in absence of these frictions, i.e., when financed with arm’s-length bonds. They are thus a simple modelling device to implicate insider agency frictions without imposing a selected mechanism while keeping the model tractable.

29 Further details are presented alongside other restructuring and bankruptcy assumptions below.
\( \beta \in (0, 1) \) of the going concern value as dead-weight loss and splits the remaining value according to absolute priority: Insider claims are junior to market debt except secured claims totalling some fraction \( \omega \in (0, 1) \) of book assets \( K_{t-1} \).\(^{30}\) That is, insiders receive\(^{31}\)

\[
V_C(K_{t-1}, a_t) = \min\{\omega K_{t-1}, V(K_{t-1}, 0, a_t)(1 - \beta)\}
\]

(8)

Market creditors receive the remainder \( V(K_{t-1}, 0, a_t)(1 - \beta) - V_C(K_{t-1}, a_t)(\leq B_{t-1}) \), defining their reservation value for accepting any out-of-court debt exchange offer in the absence of regulation. Crucially, I assume that the market debt recovery rate from an exchange offer must not fall short of \( \Lambda \in [0, 1] \), capturing the law's market creditor rights. Given these bounds, insiders will engage in out-of-court restructuring only if profitable, and thus effectively need to repay\(^{32}\)

\[
\bar{B}(K_{t-1}, B_{t-1}, a_t) = \min\left\{ B_{t-1}, \max\left\{ V(K_{t-1}, 0, a_t)(1 - \beta) - V_C(K_{t-1}, a_t), \Lambda B_{t-1} \right\} \right\}.
\]

(9)

Risk neutral market creditors price bonds at their expected returns discounted by their opportunity cost of funds \( \rho_b \), spelled out in Appendix I.1 Equation 20.

### 2.2.2 Model implication

Solution of the model boils down to solving the Bellman equation (7), corresponding policy functions of which prescribe optimal investment, financing and management policy of the firm.

The link between success probability \( p \) and management and monitoring intensity \( M_t \) specified in Equation allows me to derive a closed-form solution for effort conditional on bond issuance and

---

\(^{30}\)I interpret \( \omega K_{t-1} \) as banks’ first-lien and revolving debt claims, which receive priority over bond market claims in bankruptcy—in order to minimise agency frictions among insiders (contain management moral hazard and create incentives to monitor in the first place Diamond, 1993; Park, 2000) and limit bankruptcy litigation costs (Welch, 1997). These mechanisms are beyond this model so \( \omega \) is exogenous. If endogenised, insiders would always set \( \omega = 0 \): It redistributes ex-post from market creditors to insiders and because insiders have higher discount rates than market creditors, the market debt price today increases by more than the expected continuation value from the perspective of insiders. Moreover, by reducing market creditor recovery in bankruptcy, higher \( \omega \) expands the set of states in which out-of-court restructurings are restrained by the legislator, risking additional bankruptcy dead-weight losses, see the description of how bankruptcy and out-of-court restructuring are modelled.

As a consequence, I have to assume that insiders’ incentive to tame internal agency friction by placing some of their claims senior (\( \omega \)) is by and large invariant to changes in out-of-court market creditor rights. Relaxing this assumption, however, is seems worthy of future research.

\(^{31}\)Strictly speaking, there is another outer \( \max \) operator, comparing the \( \min \) with the bankruptcy pay-out in case market debt could be honoured in full, i.e., \( V(K_{t-1}, 0, a_t)(1 - \beta) - B_{t-1} \). This is superfluous in the model however, as insiders will never file for bankruptcy in these cases in the fist place—honouring market debt in full out-of-court spares the bankruptcy dead-weight loss.

\(^{32}\)The option to file for bankruptcy protects market debt against exchange offers in good states, in which the going concern value less bankruptcy cost is larger than what is owed to bondholders. In bad states, the legal constraint helps to prevent market creditors being always pressed against their bankruptcy reservation value.
investment directly from the first-order condition of the maximisation in (7). In addition to saving considerable computational resources during numerical solution, expression (11) facilitates important insights into how bondholder protection can reign in on moral hazard and increase bond issuance.

\[
\frac{\partial p}{\partial M_t} = \frac{\rho_t}{V(K_t, B_t, S_t, \alpha)} - \frac{\rho_t}{V(K_t, B_t, \alpha)} \quad \text{for} \quad M > 0
\]

\[
\Rightarrow M^*(a_t, K_t, B_t) = \max \left\{ 0, \sqrt{\frac{\gamma(a_t)}{\rho_t} (1 - \pi)} \left( V(K_t, B_t, \alpha) - V(K_t, B_t, \alpha) \right) - \gamma(a_t) \right\}
\]

In the remainder of this Subsection, I first describe the model mechanisms underpinning the trade-off for market creditor protection between ex-post cost of default and ex-ante discipline. I then present the numerical solution and calibration procedures. Finally, I explore counterfactual predictions for alternative market creditor rights regimes using comparative statics. Additional details to each of these steps can be found in Appendix I.

**Market creditor rights and ex-post cost of default** To understand how out-of-court market creditor protection affects ex-post cost of default, consider equation (9) together with the Bellman equation, both of which summarise the decision to file for bankruptcy:

\[
V(K_{t-1}, B_{t-1}, a_t) = \max \left\{ V_C(\cdot), V(K_{t-1}, 0, a_t) - \tilde{B}(\cdot) \right\}
\]

When firm value is large, insiders are effectively unable to cut market debt and thus \(\tilde{B}(\cdot) = B_{t-1}\). When firm value is sufficiently small, however, three qualitatively distinct cases may arise. They are illustrated in Figure 1. In the first, legal constraints are too lax to affect out-of-court market debt exchanges such that market creditors will receive exactly their bankruptcy reservation value. Notably, insiders are able to extract extra value equal to the dead-weight loss of bankruptcy. In the second case, laws constrain out-of-court bond exchanges, but the additional value which market creditors receives is less than the bankruptcy dead-weight. Hence, insiders still benefit from restructuring bond debt out-of-court relative to a bankruptcy filing. Finally, if market creditors protection is too strong for the prevailing circumstances of a distressed firm, out-of-court bond exchanges would have to grant bondholders a recovery which leaves insiders with less value than what they can expect to obtain in court. That is, market creditor rights inflict additional cost of default by prompting insiders to file for a bankruptcy procedure.

Firms become over-constrained in their out-of-court exchange offer when legacy contractual market debt debt \(B_{t-1}\) exceeds threshold \(\Lambda^{-1}(V(K_{t-1}, 0, a_t) - V_C(\cdot))\). That is, strengthening market creditor protection tightens limits on market debt beyond which default costs increase due to bankruptcy dead-weight losses. For additional algebraic details, see Appendix I.1.

**Market creditor rights and ex-ante discipline** To understand how out-of-court market creditor rights can reign in on moral hazard and promote market bond issuance, consider first the response of
Figure 1: The effect of market creditor protection on out-of-court restructuring

Bankruptcy

unconstrained

Market debt exchange

constrained

over-constrained

\[ V_C(\cdot) \]

\[ \tilde{B}(\cdot) \]

\[ \tilde{B}(\cdot) \]

\[ \tilde{B}(\cdot) \]

Notes: Schematic illustrations of how different levels of market creditor rights affect the distribution of value in market debt exchanges and may push insiders to file for bankruptcy, increasing the cost of default.

insider value to additional market debt absent bankruptcy risk: \(^{33,34}\)

\[
\frac{\partial V}{\partial B_t} = \left( \frac{1}{\rho_i} - \frac{1}{\rho_b} \right) \left[ p(a_t, M_t) \frac{\partial V(\cdot, a)}{\partial B_t} + (1 - p(a_t, M_t)) \frac{\partial V(\cdot, a)}{\partial M_t} \right] + \frac{\partial P(\cdot)B_t}{\partial M^*} \frac{\partial M^*}{\partial B_t} \leq 0 \quad (13)
\]

Under bankruptcy risk, the first summand becomes negative for non-negligible bankruptcy dead-weight because market creditors will receive less in expectation than insiders pay out. Taken together, insiders will issue market debt until the risk of bankruptcy looms—except moral hazard drives down the price of market debt too much before that point. \(^{35}\)

What determines the magnitude of moral hazard effects \(\frac{\partial M^*}{\partial B_t}\)? Considering equation (9), market debt repayment will react one-for-one to bond issuance in financially healthy states where market debt is honoured in full. By contrast, it will increase by only \(\Lambda \in [0, 1]\) if regulation binds and will not react at all if debt exchanges occur in unconstrained fashion. Hence, the differential effect of market debt on future values will be zero if market debt is sufficiently small so that it can be honoured in full in both states. \(^{36}\) For all intermediate levels, the differential effect of bond debt on future states will be negative and equal \(-\mathcal{A}\) under unconstrained debt exchanges and \(-\mathcal{A}(1 - \Lambda)\) for constrained or over-constrained...

---

33 If bankruptcy dead-weight costs are sufficiently large, the firm will always manage avoid bankruptcy in equilibrium due to the binary profitability state space.

34 Derivation of Equation (13) builds on the first order condition for bond issuance together with some intermediate steps, all of which are detailed in Appendix I.1.

35 Remember that market creditors will anticipate any moral hazard and demand yield compensation today, by lowering the price at which they are willing to buy newly issued market debt.

36 Theoretically, market debt may be so large as to trigger debt resolution in both states, in which case the differential effect of market debt on future values will be zero as well. For \(\alpha \in (0, 1)\), this would lead to bond-to-asset ratios of above 1. These equilibria are infeasible if insider governance is sufficiently sensitive, i.e., moral hazard is non-negligible, see Equation (25) in Appendix I.1.
debt exchanges. For a precise definition of $A$ see details in Appendix I.1. That is, as market creditor rights bind and tighten, moral hazard shrinks towards zero, increasing market debt issuance.

Note that the value of market debt issuance changes with $\Lambda$ only due to moral hazard. This will lead to a non-monotone reaction to expanding market creditor rights: Once moral hazard is shrunk beyond the state-specific threshold, firms will lever up with bond debt until the next unit would provoke bankruptcy dead-weight costs. Ultimately, the jump is due to the discrete nature of the profitability state space carrying positive point masses. A continuum of profitability states, by contrast, would imply some continuum of thresholds such that effects on market debt issuance cumulate continuously with growing $\Lambda$.

**Market debt and firm investment** In the model, insider agency frictions captured by $\rho_i$ effectively reduce investment compared to a hypothetical firm fully funded with market-based debt. Market debt can circumvent these frictions by substituting the applicable discount rate to the proportion in which marginal continuation value is pledged to market creditors. Effectively, market finance allows firm insiders to sideline their agency frictions and move the corporate discount rate closer to the market discount rate. A detailed analysis can be found in Appendix I.1.

**Numerical solution** I solve the model using value function iteration, plugging the closed-form solution for $M^*$ of Equation (11) into bondholders willingness to pay given by Equation (20) found in Appendix I. My initial guess for the value function iteration is $V(K_{t-1}, B_{t-1}, a_t) = 0 \forall (B_{t-1}, K_{t-1}, a_t)$. Hence, the equilibrium will correspond to that of a model where the firm faces a distant terminal period, after which the firm’s value is zero. More details can be found in Appendix I.2.

**Calibration** The calibration targets key moments of risky compustat firms (S&P entity rating BBB- or worse) over the decade 2010Q1 to 2019Q4. Details are described in Appendix I.3 alongside Table A.1 showing calibrated parameter values.

Figure 2 compares selected empirical moments to those of simulated model data. Panel 2a presents averages for the market debt share and operating profitability (model counterpart: $a_t K_{t-1}^{\alpha_t}/K_{t-1}$) as well as moments characterising its dispersion. The calibrated model matches baseline balance sheet metrics almost perfectly: The average bond intensity is 27.95% (27.55% in the data) and average profitability is 2.81% (2.73% in the data). Equally important, it realistically captures extreme profitability events: Under low (high) profitability, operating profits relative to assets averages to $-18.8\%$ ($3.4\%$) in the model. In the data, I can split the distribution of profit rates such that averages of both partitions,

---

Naturally, magnitude and pattern of model predictions are sensitive to calibration choices. Rigorous structural estimation—even if it was less computationally burdensome than it would be in this case—cannot reliably clear quantitative ambiguity as it still may be corrupted by features entirely artefact to model choices taken for the sake of tractability. For this reason, I turn to reduced-form estimation exploiting an unexpected change in jurisprudence which substantially strengthened the protection of bondholder rights.
Figure 2: Moments from model simulations and empirical counterparts

(a) First order moments

(b) Kaplan-Meier duration estimates

Notes: Comparing moments from 5000 model firms simulated for ten years (40 model periods) to empirical counterparts from quarterly compustat data on risky non-financial firms (S&P rating BBB or worse) for the decade starting 2010Q1. Top panel: Averages of four continuous variables and one binary variable. Whiskers mark 95% confidence intervals for empirical moments. A bad shock refers to a shift from the fortunate into the unfortunate profitability regime, i.e., $a_t = a_{t-1} = 1$ in the model and $\text{EBITDA}_t/\text{Assets}_t \leq x | \text{EBITDA}_{t-1}/\text{Assets}_{t-1} > x$ in the data. Bottom panel: Kaplan-Meier survival estimates for the duration of low profitability spells. Average spell durations for data and model displayed in the top right corner alongside the $p$-value of a test on their equality.

$-18.9\%$ and $3.0\%$, come very close.\(^{38}\) The 95%-confidence interval for the empirical probability to transition from the higher into the lower profitability partition is $[0.49\%, 0.66\%]$. In the model, this probability endogenously depends on governance quality and averages at $0.63\%$.

\(^{38}\)Overall, profitability states are slightly more spread out in the model. This is necessary to match other moments, especially to prevent overshooting in the high-low transition probability and the bond share.
Panel 2b compares Kaplan-Meier survival estimates of expected probabilities for spells of low profitability to exceed a given duration. In the data, low profitability is defined as before, i.e., the partition of the profitability distribution whose mean matches the corresponding model moment. The simulated data spells track the distribution of empirical spell durations reasonably closely. Probabilities for spells to persist beyond the first five quarters are slightly higher in the model but are compensated by higher exit probabilities thereafter. Taken together, the expected duration of low profitability spells stands at about five quarters in the model and does not deviate significantly in the data.

Comparative statics across regimes of different market creditor rights How do firm outcomes change across different degrees of bondholder protection? I keep all parameters at their calibrated baseline values and vary $\Lambda$. The resulting comparative statics are shown in Figure 3: For each value of $\Lambda$, it plots the firm’s average bond debt and capital stock from 5000 firms simulated for 40 model quarters. As bond haircuts get compressed in out-of-court bond exchanges, neither bond issuance nor investment reacts initially. However, once bondholder rights push the effective (moral hazard) cost of bond finance below the excess cost of insider finance, bond issuance shifts into a new equilibrium (levering up to the point where the next unit would trigger bankruptcy upon and unfortunate profitability shock), making additional investments profitable. Where exactly the shift occurs depends on parameters including $\rho_i$, $\gamma(a_t)$ and $\pi$, all of which plausibly vary empirically across individual firms within the population of firms. Hence, the aggregate response is likely to look more hump-shaped, depending on the distribution of those parameter constellations.

Once bondholder protection overcame insider moral hazard, further strengthening only add constraints to ex-post bond exchanges, increasing the expected cost of distress for any given bond leverage. In response, firms shrink their bond issuance, gradually this time, and curtail investment. Total firm value tracks the pattern of capital very closely and is displayed in Figure A.1 in Appendix I.4

The net effect on total assets (and hence investment) is ambiguous. Reforming market creditor rights regimes may change capital stocks by -4.4% to +13% relative to the baseline ($\Lambda = 0.57$). Given that the aggregate of assets held by high-yield-rated public firms stands at about 150% of GDP, aggregate wealth gains may be considerable. Similarly, effects observed for bond issuance could imply growth in the aggregate corporate bond market between -15% and +45%, considering that outstanding high-yield issues account for about a third of overall market by volume. However, the aggregate can be influenced by amplifying or dampening general equilibrium feedback as well as the distribution of firm-specific sensitivity points. Dispersion thereof will attenuate the economy-wide effects relative to largest firm-specific impact.

To summarise, the economic impact of market creditor rights is possibly large but its direction is a-priori ambiguous. Knowing on which side of the curve a given institutional setup resides indicates the desirable nature of reform.
3 Evidence on the economic role of market creditor rights

In this section, I describe the US court verdict which expanded market creditor rights in 2014, outline data sources, discuss my identification strategy and present the evidence on the verdict’s economic ramifications. I group evidence on effects by whether they realize ex post or ex ante of distress.

3.1 The Marblegate ruling

In *Marblegate Asset Management v. Education Management Corp*, the bondholder *Marblegate Asset Management* sued against an exit-consent transaction proposed by a coalition of the distressed issuer *Education Management Corp* and its secured term-loan creditors. The debtor business—founded in 1962 and growing into one of the largest for-profit providers of US college and graduate education with more than 20,000 employees—consisted of a holding company liable for 1.3 billion USD of secured term loans and a subsidiary liable for 500 million USD of unsecured bonds. Marblegate Asset Management was a minority bond investor, holding par value of 14.3 million USD.

When Education Management slid into financial distress in 2014, it commenced negotiations with secured term loan creditors. The resulting restructuring support agreement proposed a distribution of debt hair-cuts across all creditors, offering bondholders to exchange their claims for new bonds with an effective recovery of roughly 33%. To discourage hold-outs from the bond exchange offer, the coalition of debtor and senior secured creditors designed an exit-consent transaction: In case of dissent, secured term lenders would release the holding parent of loan guarantees, triggering an indenture-conform cancellation of the bonds’ parent guarantee via an extant intercreditor agreement. Then, secured term lenders would foreclose on the company’s assets—including assets of the subsidiary liable for bond...
debt—and immediately sell to a newly formed subsidiary. Consenting bondholders would receive new claims against the newly formed subsidiary. Dissenting bondholders, by contrast, would be left with a nominally unimpaired, yet effectively worthless claim against an empty corporate shell.

Marblegate Asset Management held out and sued against the coalition in October 2014 at the Court of the Southern District of New York, alleging that the bond exchange offer was overly coercive. After hearings and other proceedings in November, the court shared an opinion with both parties on December 15, which went into effect on December 30, 2014. Broadening the interpretation of the Trust Indenture Act Section 316(b), the court largely sided with bondholders:

The record before this Court, however, leaves little question that the Intercompany Sale [moving foreclosed assets out of reach for dissenting bondholders] is precisely the type of debt reorganization that the Trust Indenture Act is designed to preclude. [...] The Court cannot accept an interpretation that is neither mandated by the statute's text nor remotely in conformity with the statutory purpose and legislative history. [...] This Court is not so naïve as to think that establishing Plaintiffs' ultimate right to full payment will not pose problems for the Proposed Restructuring. [...] Yet, whatever the ultimate cost to [the debtor], its creditors, its employees, and its students, the Trust Indenture Act simply does not allow the company to precipitate a debt reorganization outside the bankruptcy process to effectively eliminate the rights of nonconsenting bondholders.

The verdict wielded implications far beyond the original case and prompted extensive press coverage, law firm client briefs and academic debate (New York Times, 2015a; Reuters, 2015; Wall Street Journal, 2015; Chapman and Cuttler LLP, 2015; Roe, 2016). Perhaps most importantly, the verdict was unanticipated: Members of the US National Bankruptcy Conference noted that [Marblegate] can be viewed as making out of court restructurings involving bonds covered by the [Trust Indenture Act] by a less than unanimous bondholder vote more difficult than previously thought. (National Bankruptcy Conference, 2015, emphasis added)

revealing how the verdict upended the prevailing understanding and expectations about how existing law is applied.

The plaintiff, Marblegate Asset Management, was a hedge fund accumulating distressed debt to seek the risk-return of active restructuring engagement. However, the court's ultimate concern lay with

39 The Southern District of New York is the most important bankruptcy court in the US alongside Delaware and the Southern District of Texas.

40 While the court made its objections clear at this point and ordered the Education Management Corp parent to continue to guarantee the bond debt, the final verdict condemning the transaction to run afoul of the Trust Indenture Act was officially issued on June 23, 2015.
bondholders of the garden-variety: institutional wealth managers like insurers or pension funds as well as retail investors, who invest in bond markets for portfolio diversification purposes, that is, precisely to avoid debtor-specific monitoring and concentrated financial exposure. Lacking both the relationship as well as coordinative capacity to effectively participate in restructuring negotiations, they often see no better option than to sell to professional distressed debt investors once distress depresses the value of their securities. Hence, the ruling was driven by the desire to “give courts broad power to police workouts” (Bratton and Levitin, 2018) and ensure that arm’s-length bondholders receive a more equitable share of the gains from avoiding the cost of bankruptcy. As such, the verdict was not motivated by concurrent economic considerations. For example, there no single mentioning of economic terms like “corporate investment” (or variations thereof), "economic activity", “employment”, “recession”, “growth”.

While the court acknowledged the risk posed to out-of-court restructurings, it emphasised its interpretation of the original intention of the law. However, market observers did worry about elevated default costs as firms would be pushed into bankruptcy instead of restructuring debt swift and smoothly out of court:

Ultimately, the largest take-away is that minority bondholders may now have increased leverage when negotiating with issuers and other creditors, and troubled companies and their creditors will therefore likely have to reconsider what they can accomplish in an out-of-court restructuring on a non-consensual basis, without resorting to the filing of a bankruptcy petition. (Chapman and Cuttler LLP, 2015)

The defendants filed the verdict for review in the Second Circuit Court of Appeals. In a contentious two-vs-one decision, the higher court largely overturned the original Marblegate ruling on January 17, 2017. For this reason, my main analysis focuses on the original ruling of Dec 30, 2014 and the two-year sample until the end of 2016. A perceived positive probability of overturning renders estimates conservative.

The Second Circuit ruling itself is of narrower statistical value for three reasons. First, the overturning was partial in the sense that the Court of Appeals left uncertainty as to whether exit-consent transactions could target parent guarantees in the same way as they used to do (Millar, 2017; Bratton and Levitin, 2018). Second, after the original verdict sparked attention, anticipation effects accompanying the appeal process and adjustment measures taken in the meantime muddy economic impacts of the 2017 verdict. Finally, the split decision will have made market participants might have become wary about similar policy shifts or according use of judge discretion in the future. However, Appendix III.8 repeats the key event studies for the Court of Appeals ruling and documents a consistent reversal of effects.

41 The larger the cost of bankruptcy, the more does the balance of power affect the distribution of value out-of-court. In fact, in the case of EDMC, the cost of bankruptcy would have been disastrous because a formal bankruptcy filing would have jeopardized an important source of revenue from the Department of Justice, so-called Title IV funding. This made the out-of-court conflict over value especially intense, cumulating in litigation.

42 At the end of 2015, US congress lobbying attempted to overturn the courts decision through legislation but failed last minute (New York Times, 2015b).
3.2 Data

I explore firm-level balance sheets, cash flow statements, income statements, bankruptcy filings, data on bond issuance, returns, ownership and default recovery rates and information on loan issuance and lending relationships. Throughout the analysis, I exclude financial firms (NAICS code 52) and public administration (NAICS code 9) and use the following notation: Firms are indexed by \( f \) while \( q (m) \) marks the quarter (month) of the observation.

Quarterly firm financial statements are sourced from Standard & Poor’s compustat merged with more detailed information on the debt structure in CapitalIQ. I match dates and auxiliary data for all bankruptcy filings in the sample between 2013Q1 and 2018Q4 covered by New Generation Research’s bankruptcydata.com. In addition, I aggregate bond issuance from Mergent’s FISD at the issuer-quarter level and match them to GVKEY-quarters via correct historical CUSIP-6 identifiers.

To measure the actual dispersion of bondholdership, I can draw on the data from the National Association of Insurance Commissioners (NAIC) detailing the (corporate) bond portfolio for each and every insurance company in the US. The S&P CapitalIQ CUSIP-9 link allows me to consolidate the information at the firm level, gauge the size distribution of each firm’s bond holdings and relate it to firm-level variables based on CapitalIQ or compustat.

Data on bond restructurings and associated recovery rates are sourced from Moody’s Default and Restructuring Database.

For auxiliary analyses documented in Appendix III, I use Refinitiv’s DealScan database and associated linking tables updated from Chava and Roberts (2008) to identify lending relationships and measure lenders’ financial health with Standard & Poor’s SNL data via a name matching algorithm. Moreover, I obtain monthly bond returns from the TRACE database in the version compiled by WRDS to which I merge information about monthly bond ratings, bond maturity and covenants as well as issuer characteristics from Mergent’s FISD.

3.3 Exposure to Marblegate and empirical identification

The Marblegate verdict changed the resolution of distressed bond debt by increasing bondholder protection—and thereby affected different groups of firms differentially. First, firms without default risk are unconcerned about any regulation affecting distress resolution. Second, even risky firms should have been insensitive if bond markets were irrelevant to their financing. Taken together, firms’ exposure to Marblegate should grow in the firm’s

- default risk, and
- bond debt relative to asset value

\[43\] I merge information using CIK identifiers of SEC filings linked to GVKEY identifiers by WRDS.

\[44\] I use linking information provided via CapitalIQ to track changes in CUSIP-GVKEY affiliation over time.
which can be measured from ratings and balance sheet data.

The differential reaction of high-exposure firms compared to low-exposure peers can shed light onto the impact of Marblegate and hence the economic effects of stronger market creditor rights.\textsuperscript{45} Associated difference-in-differences estimates can be interpreted based on the following three considerations.

First, broader economic shocks may confound Marblegate’s effects on investment of borrowing activity. Fortunately, the macroeconomic environment was stable and rather favorable at the time as evidenced in Appendix III.1.\textsuperscript{46}

Second, a firm’s default risk and bond intensity correlates with other firm characteristics, including unobservable ones. Measuring default risk and bond intensity right before Marblegate renders such correlation innocuous for the identification of Marblegate’s effects—unless: i) Marblegate coincides with another relevant shock or ii) confounding firm characteristics alter the firm’s sensitivity to market creditor rights. The first concern is mitigated by the tranquil macroeconomic environment at the time—but can never be fully ruled out. Similarly, there is no obvious confounder fitting the second concern, but absolute elimination is likewise impossible. To simultaneously address these issues, I report results from an alternative empirical approach in Section 3.5.3 whose identifying assumptions do neither rely on the exact date of the Marblegate ruling nor on measures of bond intensity or risk.

Specifically, I investigate firms’ propensity to switch to bond market finance upon an adverse shock to the balance sheet of their relationship lender (Becker and Ivashina, 2014, and others). Comparing such firm-quarter-specific shocks occurring at some point before Marblegate to similarly sized shocks occurring sometime thereafter tests for any change in the marginal appeal of bond finance that could be attributed to the ruling.

Third, when bonds are in concentrated ownership, coercive debt exchange offers are irrelevant for effectuating out-of-court debt restructuring: large bondholders can engage and preserve their interests in negotiations with the debtor and other creditors, see Section 2.1. Hence, bond intensity is a valid measure of exposure only if it correlates well with bondholder dispersion. I test this below.

There is no exhaustive US micro data on bond ownership—except for the insurance industry. Insurers are the single most important class among US corporate bond investors (Koijen and Yogo, 2023) and security-level portfolio data from the US National Association of Insurance Commissioners allows me to calculate firm-level bondholder dispersion \textit{within insurer holdings}. Yet, insurers still account only for about a third of all outstanding US corporate bonds, and even less within the segment of risky high-yield bonds. Thus, constructing a meaningful measure from the NAIC data requires the assumption that the

\textsuperscript{45}The theory presented in Section 2.2 suggests that effects will go in different directions for different firms, depending on whether ex-ante disciplining or ex-post complications dominate. Analyzing potential effect heterogeneity across firms appears to be a promising route for future investigations.

\textsuperscript{46}In mid 2014, oil prices dropped and triggered financial distress among US oil and gas producers, refineries and pipeline operators. I confirm that my results are not driven by distress in these sectors by excluding them in robustness checks shown in Appendix III.7. Any reductions in input costs for other sectors would go against the negative repercussions I am documenting for Marblegate.
Figure 4: Bond intensity and bond ownership dispersion

(a) Unadjusted

(b) Controlling for total assets

Notes: Binned scatter plots of firm-level data for 2014 Q4; right panel controls non-linearly for firm size measured by its decile in the cross-sectional distribution of asset values. Bond dispersion (y-axis) is defined as the share of a firm’s bond debt spread over positions individually holding less than 0.1%. It is proxied using NAIC data on individual insurer bond portfolios, assuming that the holding size distribution of insurers is representative for other sectors (mutual funds, banks, households, and foreign investors).

distribution of individual positions among insurers is roughly representative—or at least independent—of the distribution among other classes of owners: mutual funds, hedge funds, banks and the household sector. This assumption appears plausible enough to assess rough correlations.

Figure 4 shows binned scatter plots relating a firm’s bond intensity to its bond dispersion as measured by the share of the firm’s bond debt spread over positions individually holding less than 0.1% of the firm’s total outstanding bonds. The data concerns 2014 year-end values and is split by S&P’s long-term issuer rating of default risk. The right panel controls non-linearly for firm size measured by its decile in the cross-sectional distribution of asset values. Irrespective of the perspective—and especially even after controlling for firm size—there is a strong positive association between bond intensity and bond dispersion.\(^\text{47}\)

Beyond aforementioned shortcomings, contemporaneous bond dispersion is an imperfect measure of exposure to Marblegate because bonds are easily traded in secondary markets: bond dispersion today will be an unreliable measure of bond dispersion when debt restructuring becomes necessary. Instead, the volume of outstanding bond debt indicates the expected dispersion at restructuring.\(^\text{48}\) Relative to total assets, it will measure expected reorganisation risks posed by hold-outs.

\(^\text{47}\)Interestingly, dispersion tends to be even larger for high-yield bond issuers after accounting for the fact that they tend to be smaller than investment-grade firms.

\(^\text{48}\)Even when normalised by firm size, the left panel of Figure 4 confirms a strong correlation with bond dispersion.
3.4 Effects of stronger bondholder protection on distress resolution

Did Marblegate affect distress resolution in a measurable way? And if so, did it in fact complicate distress resolution? Restricting coercive bond exchange offers ought to raise bondholder’s recovery out of court. But importantly, it also empowers hold-outs that may over-burden consensual distress resolution and force firms into costly bankruptcy procedures. In this subsection, I provide evidence supporting both predictions.

Figure 5 illustrates outcomes of 130 out-of-court distressed bond exchanges between 1990 and 2020 in the US, details on which are covered by Moody’s Default and Restructuring Database. The left panel plots the recoveries of bonds against the total recovery for all debt claims, which can be interpreted as a measure of overall distress severity. Non-parametric local regression estimates plotted in dashes suggest a positive and essentially linear relationship between bond recoveries and total recoveries. Importantly, under Marblegate bond recovery rates increase conditional on total recovery. The effect strengthens as the distributional conflict between claimholders intensifies. This is consistent with the prediction Marblegate protected bondholders against coercive bond exchanges. In fact, Figure A.6 in Appendix III suggests that much of the higher average bond recoveries are driven by lower participation in exchange offers, e.g., hold-outs.

To test statistical significance within that set of 130 observations, I estimate

$$\text{bondrecovery}_i = \beta_0 + \sigma_{\text{sector}(i)} + \tau t_i + \beta_1 M_i + \beta_2 \text{totalrecovery}_i + \beta_3 (M_i \times \text{totalrecovery}_i) + e_i \quad (14)$$

where $\sigma_{\text{sector}(i)}$ filters industry-specific differences at the NAICS 1-digit level and $\tau t_i$ captures any linear time trend in bond recovery rates from out-of-court exchange offers. The right panel of Figure 5 plots $\hat{\beta}_1 M_i + \hat{\beta}_2 \text{totalrecovery}_i + \hat{\beta}_3 (M_i \times \text{totalrecovery}_i)$ across different levels of total recovery alongside its 95% confidence intervals. Conditional on industry fixed effects and time trend, estimates indicate a statistically significant tilt induced by Marblegate in the relation between bond recovery and overall recovery to the benefit of bondholders was also statistically significant.

Figure 6 presents evidence suggesting that emboldened hold-outs indeed pushed additional firms into bankruptcy to restructure bond debt. It shows average Chapter 11 filing rates across groups of firms differing by financial distress and bond intensity, comparing the two-year period preceding with the two years after the Marblegate verdict. Conditioning on firm-quarter-specific financial distress—measured via classical Altman (1968) Z-scores—is important to filter any broad fluctuations in economic conditions. Two observations stand out. Firstly, the Z-score offers a reliable measure of distress in my sample, clustering the majority of bankruptcy filings in its lowest sample quartile. Secondly, and more importantly, the post-Marblegate period experiences an increase in the tendency to file for bankruptcy conditional on distress. This increase in concentrated among bond-intensive firms. This is consistent with the prediction that stronger protection of uncoordinated bondholders may create hold-outs that over-burdened out-of-court restructuring.

Bankruptcy procedures add direct and indirect costs which may devour as much as a fifth of the firm’s going concern value (Epaulard and Zapha, 2022).
Figure 5: Marblegate bolstered bond recoveries out-of-court

Notes: Recovery rate information for 130 out-of-court distressed bond exchanges between 1990 and 2020 in the US from Moody’s Default and Restructuring Database. Circle areas represent the total volume of debt outstanding before default. Estimates shown on the right conditional on linear time trend and industry fixed effects (NAICS single-digit).

Figure 6: Marblegate pushed bond-intensive firms into court


Are these differences statistically significant and robust? To test, I estimate a regression for quarterly bankruptcy filings of firms with Z-scores below the median. The effect of Marblegate on bankruptcy
filing patterns will be detected by the interaction of two binary indicators: one for the Marblegate period, \( M_q = 1 \) \((q \in \{2015Q1, \ldots, 2016Q4\})\) as well as one for bond-intensive firms \( B_{fq} = 1 \) \((\text{bonds}_{fq}/\text{assets}_{fq} > 0.25)\):\(^{50}\)

\[
\text{filing}_{fq} = \beta_1 M_q + \beta_2 B_{fq} + \beta_3 M_q \times B_{fq} + x_{fq} \gamma + e_{fq} \tag{15}
\]

where \( \text{filing}_{fq} \) is a binary variable indicating whether firm \( f \) filed for bankruptcy in quarter \( q \). The interaction coefficient, \( \beta_3 \), captures the additional effect of Marblegate on the exposed population of firms. In the largest model, firm-level controls \( x_{fq} \) include firm and quarter fixed effects, the full set of indicators for quintiles of the quarterly distribution of total assets as well as the two-digit NAICS industry classification, both sets interacted with the Marblegate indicator. Controlling for the interaction of Marblegate and size is potentially important because large firms are more likely to be bond-intensive and may require formerly court procedures simply due to their size, and hence \( B_{fq} \) might simply capture a size effect. Similarly, controlling for period-specific industry effects rules out that bond-intensity simply picks up on industry-specific shocks.\(^{51}\)

Table 1 presents estimates of \( \beta_3 \), alongside \( \beta_1 \) and \( \beta_2 \) and across a cascade of different control vectors. The estimated \( \hat{\beta}_3 \) remains stable and highly significant across the board, and is economically sizable: Marblegate increased the propensity to file for Chapter 11 bankruptcy by around 0.5 percentage points for bond-intensive firms—more than doubling their sample base rate.

It is worth noting that all these effects become more pronounced when I restrict attention to pre-packaged bankruptcy filings, i.e., bankruptcy petitions filed after major claim holders agreed on a restructuring plan. These pre-packs are the closest in-court substitute to an out-of-court restructuring. Private restructuring support agreements (RSAs) often stipulate a bankruptcy petition with a restructuring plan akin to the out-of-court deal in case of debt exchange failure.\(^{52}\)

### 3.5 Effects of stronger bondholder protection on healthy firms

By affecting size and distribution of firm value ex post, institutions for distress resolution carry profound implications for economic choices ex ante (e.g., Djankov et al., 2008; Becker and Josephson, 2016; Lian and Ma, 2021). Section 2.2 describes how market creditor rights may bolster or curb bond financing and investment of healthy firms, depending on the relative strength of two effects: The erosion of resolution efficiency ex post, and the control of moral hazard ex ante. I presented evidence on adverse ex-post effects of Marblegate in the previous section. But ex-ante outcomes also depend on potential insider commitment. This section presents evidence on the impact of Marblegate on ex-ante financing and

---

\(^{50}\)The median bond intensity for risky, non-financial firms is 24.3% in 2014 year-end compustat data. The average stands at 27.2%.

\(^{51}\)For example, firms in the extraction, distribution or refining of oil and gas experience economic difficulties after a sustained drop in oil prices throughout 2014.

\(^{52}\)Pre-packaged bankruptcy filings are often argued to be faster and cheaper. This is consistent with the theory outlined in Section 2.2: Stronger market creditor rights push those firms into bankruptcies for which dead-weight losses are small. For other cases, stronger market creditor rights re-distribute value out-of-court instead, e.g., see Figure 5.
investment choices of US firms. Ultimately, the direction of effects carry information about whether market creditor rights prevailing in the US are too strong or too weak.

### 3.5.1 Investment

The question that presumably carries the largest economic significance is whether Marbelgate affected firm investment—and in which direction. To test, I estimate the difference-in-differences of non-financial firms’ investment rates, defined here as capital expenditures relative to last quarter’s assets, using OLS fixed-effects regressions.\(^{53}\) I am interested in how bond-intensive firms differ in their investment activity over time (the first difference) relative to other firms (the second difference). I measure bond-intensity a quarter before the verdict to side-step potential Marbelgate-induced selection, indicating bond-intensive firms by \(B_{f,2014Q3} = 1(\text{bonds}_{f,2014Q3}/\text{assets}_{f,2014Q3} > 0.25).\)^{54} The threshold of 25% is close to the variable’s median (mean) of 24.3% (27.2%) in 2014Q3. To verify Marbelgate coincided

\(^{53}\)To prevent outliers from driving OLS estimates, I winsorise investment rates by 1% at both tails.

\(^{54}\)However, effects are actually robust towards alternative measurement timing assumptions. For example, see Figure A.10 in Appendix III.7 using quarter-specific, that is, contemporaneous bond intensities.
with a clear shift—as opposed to merely bisecting a pre-existing trend—I estimate quarter-specific coefficients \( \beta(q) \):

\[
\frac{\text{capex}_{f,q}}{\text{assets}_{f,q-1}} = \phi_f + \tau_q + \beta(q)B_{f,2014Q3} + e_{f,q}
\]  

(16)

where fixed effects \( \phi_f \) and \( \tau_q \) filter firm and quarter-specific variation.\(^{55}\) I estimate (16) on the sample with a S&P long-term entity high-yield rating as well as in the placebo sample of investment-grade firms for comparison.

Figure 7 visualises estimates of \( \beta(q) \), relative to the difference in 2014Q4, with their 95% confidence intervals. The left panel shows estimates for the sample of risky firms—with a S&P long-term entity high-yield rating—as well as in the placebo sample of investment-grade firms for comparison on the right. To avoid selection effects, ratings are fixed to their 2014Q3 values, i.e., right before Marblegate. For risky firms, I find a sharp and persistent drop in investment rates of about -40 basis points for bond-intensive firms vis-a-vis low-bond firms from the first quarter of 2015 onwards, i.e., right after the Marblegate verdict on December 30, 2014. These effects are not only statistically significant but also quantitatively considerable given that average investment rates range around 150 basis points. Before 2014Q4, differences between the two groups of firms are insignificant show no trend. By contrast, safe firms stay virtually unaffected, consistent with the hypothesis that firms with little risk of distress should not react to a change in institutions governing distress resolution.\(^{56}, 57\)

These effects are robust to additional controls and in alternative samples. The DiD setup of Equation (17) adds a variable vector of controls \( x_{f,q} \) and captures the average Marblegate effect for bond-intensive firms by \( \beta \):\(^{58}\)

\[
\frac{\text{capex}_{f,q}}{\text{assets}_{f,q-1}} = \phi_f + \tau_q + \beta(M_q \times B_{f,2014Q3}) + x_{f,q} \gamma + e_{f,q}
\]  

(17)

Table 2 presents results across a range of specifications varying controls and sample. The effect remains statistically significant, ranging from -22 to -43 basis points, corresponding to an average relative reduction of firm-level investment rate of about -10% to -25%. Notably, for the placebo sample of investment-grade firms the effect collapses and is statistically indistinguishable from zero. The last column (5) dispenses with ratings data and instead measures firm default risk using Z-scores to include unrated firms, documenting a very similar effect. Appendix Table A.3 shows estimates to be robust for alternative samples.

\(^{55}\)I control for firm dynamics and other potential confounders in a next step.

\(^{56}\)Consistent with Marblegate affecting bond-intensive firms, the drop shown in the left panel of Figure 7 indeed reflects bond-intensive firms cutting investment instead of low-bond firms increasing investment. Appendix Figure A.7 plots average quarterly investment rates for each group of firms in each sub-samples. While investment rates for bond-intensive risky firms almost always ranged above those of low-bond firms before Marblegate, the relation reversed for the post-Marblegate period, driven by movements of bond-intensive firms.

\(^{57}\)After the Second Circuit overturned the original Marblegate ruling on January 17, 2017, investment effects reverse, see Figure A.12 in Appendix III.8. As discussed earlier, the January 2017 ruling is less clear-cut from a statistical viewpoint,
Figure 7: Marblegate’s effect on firm investment rates

(a) Risky firms

(b) Safe firms (placebo)

Notes: Estimates of average investment rates—net of firm-fixed effects—by quarter and bond intensity from Equation (16) within compustat non-financial firms. The left panel shows results for risky firms with a S&P high-yield rating right before Marblegate in 2014Q3. The right panel shows results for safe firms with a S&P investment-grade rating in 2014Q3. Whiskers mark 95% CI for \( \beta(q) \) based on standard errors clustered at the firm level.

Table 2: Marblegate’s average effect on investment rates across specifications

<table>
<thead>
<tr>
<th></th>
<th>(1) Plain</th>
<th>(2) Baseline</th>
<th>(3) Placebo</th>
<th>(4) Time ( \times ) Industry</th>
<th>(5) Beyond Ratings</th>
</tr>
</thead>
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<tr>
<td>Marblegate ( \times ) Bond-intensive</td>
<td>-0.0043***</td>
<td>-0.0032***</td>
<td>0.0002</td>
<td>-0.0022***</td>
<td>-0.0022***</td>
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<tr>
<td></td>
<td>(0.0010)</td>
<td>(0.0007)</td>
<td>(0.0005)</td>
<td>(0.0007)</td>
<td>(0.0005)</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Quarter FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Quarter ( \times ) Industry FE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Average dependent</td>
<td>0.0153</td>
<td>0.0161</td>
<td>0.0132</td>
<td>0.0161</td>
<td>0.0119</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.71</td>
<td>0.75</td>
<td>0.81</td>
<td>0.77</td>
<td>0.57</td>
</tr>
<tr>
<td>( N )</td>
<td>9489</td>
<td>7706</td>
<td>5543</td>
<td>7672</td>
<td>21459</td>
</tr>
</tbody>
</table>

Notes: Estimates of Equation (17) using compustat sample of non-financial firms. Sample restricted to firms with a S&P rating of BB+ or worse; except column (3) and (4), which focus on investment grade-rated firms and all firms with a below-median Z-score, respectively. Ratings and Z-scores refer to pre-Marblegate values observed in 2014Q3. Dependent variable is capital expenditures rel. to last quarter’s assets. The binary variable Marblegate indicates quarters 2015Q1-2016Q4. Firms are considered to be “bond-intensive” if their bond debt relative to assets exceeds 25% a quarter before Marblegate. Firm dynamics include by four lags of the investment rate, four lags of the change in the debt-to-asset ratio and lagged Tobin’s \( Q \). Industry fixed effects based on 2-digit NAICS codes. Standard error in parentheses clustered at the firm level. *** \( p < 0.01 \), ** \( p < 0.05 \), * \( p < 0.10 \).

which may explain why effects are more gradual.

58 Note that firm and quarter fixed effects \( \phi_f \) and \( \tau_q \) render level effects for \( B_{f;2014Q3} \) and \( M_q \) superfluous.
Discussing alternative interpretations  In the model of Section 2.2, moral hazard associated to
market leverage lured insiders to care less about distress. Alternatively, it is conceivable that insiders
would use bond finance to gamble and (over-) invest into very risky projects. Would the interpretation
of estimated investment effects be different if moral hazard was of the gambling type? Bond-financed
over-investment into risky negative-NPV projects would allow insiders to benefit from greater upside
while squeezing market creditors more in bad states. But again, market creditors would guard ex ante
by demanding higher yields, forcing insiders to internalize the cost of moral hazard and thus ultimately
deter market finance—and investment, albeit of lower quality. Market creditor protection in turn limit
insiders’ ability to squeeze market creditors in bad states, discouraging gambling and thereby set into
motion the same virtuous spiral of market lending and investment. Hence, also under these assumptions,
negative investment effects indicate that the (negative) default cost effect of market creditor rights
overcompensates its (positive) commitment effect.

May results be driven by a precautionary motive instead of an increase in corporate discount rates?
Arguably, firms might become reluctant to convert safe liquid assets into illiquid investment lotteries if
Marblegate increase default costs. In the presence of financial constraints, such a precautionary motive
could explain the cut in capital expenditure even without any changes to corporate discount rates.
However, the evidence is inconsistent with such a view, in which lower capital expenditure outflows
would lead to larger buffers of liquid assets. Instead, cuts in investment go hand in hand with a reduction
of net debt issuance, see Appendix III.5.

3.5.2  Bond financing

Market creditor rights can affect investment because they change the cost of default and moral hazard
associated to bond financing, affecting debt structure and hence corporate discount rates. On the one
hand, stronger bondholder protection can offer a commitment device for insiders and thereby encourage
bond finance. On the other hand, higher cost of restructuring bond debt will dampen bond issuance,
raise financing costs and undermine investment. Do the investment effects documented in the previous
subsection coincide with cuts to firms’ bond financing?

I investigate bond issuance analogously to the way I estimate investment effect. That is, I replace the
dependent variable in the DiD Equation (17) by an indicator for bond issuance:

\[ 1(Issue_{tq}) = \phi_f + \tau_q + \beta(M_q \times B_{f,2014Q3}) + \alpha_{fQ} + \epsilon_{fq} \]  

(18)

Notation and measurement of right-hand side variables replicates the previous set-up while firm-level
dynamic controls reflect the change in the dependent and include eight auto-regressive lags, lagged
Tobin’s \( Q \), lagged share of liquid assets, year-on-year change in the liquid asset share and quarter-
industry-specific fixed effects. Many bond issues are small, i.e., barely complicating distress resolution,
so I focus on quarters where volumes exceed 5% of book assets.\(^{59}\)

\(^{59}\)Appendix Table A.4 demonstrates robustness for other thresholds.
Table 3 presents the results across a range of specifications varying controls and sample. The different columns replicate set-ups tested for investment rates and add Column (6) with estimates for the intensive margin of bond issuance. Estimates of $\beta$ are significantly negative, indicating that bond-reliant firms reduced the quarterly probability of new issuances for by -2.4 to -5.0 percentage points in response to Marblegate—except among the placebo sample of investment-grade companies. Given average issuance rates of the same order of magnitude, these estimates imply a near-collapse of bond financing activity for affecting companies. I find no significant effect at the intensive margin.

Table 3: Marblegate’s effect on bond issuance

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain</td>
<td>Baseline</td>
<td>Placebo</td>
<td>Time \times Industry</td>
<td>Beyond Ratings</td>
<td>Int. Margin</td>
</tr>
<tr>
<td>Marblegate \times Bond-intensive</td>
<td>-0.029***</td>
<td>-0.050***</td>
<td>-0.016</td>
<td>-0.051***</td>
<td>-0.023***</td>
</tr>
<tr>
<td>(0.008)</td>
<td>(0.011)</td>
<td>(0.014)</td>
<td>(0.012)</td>
<td>(0.005)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Firm dynamics</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Quarter FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Quarter \times Industry FE</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level effects</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average dependent, bond-intensive</td>
<td>0.058</td>
<td>0.059</td>
<td>0.065</td>
<td>0.059</td>
<td>0.024</td>
</tr>
<tr>
<td>Average dependent, not bond-int.</td>
<td>0.022</td>
<td>0.022</td>
<td>0.049</td>
<td>0.022</td>
<td>0.006</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.11</td>
<td>0.16</td>
<td>0.16</td>
<td>0.19</td>
<td>0.17</td>
</tr>
<tr>
<td>$N$</td>
<td>9546</td>
<td>8153</td>
<td>6529</td>
<td>8119</td>
<td>20578</td>
</tr>
</tbody>
</table>

Notes: Estimates of Equation (18) using compustat sample of non-financial firms covering quarters 2013Q1 to 2016Q4. Dependent variable is a binary indicator for a bond issuance >5% of assets, except column (6) showing results for log bond issuance relative to assets. Sample restricted to firms with a S&P rating of BB+ or worse; except column (3) and (5), which focus on investment grade-rated firms and all firms with a below-median Z-score, respectively. Column (6) restricts to firm-quarters with bond issuance. The binary variable Marblegate indicates quarters 2015Q1-2016Q4. Firms are considered to be “bond-intensive” if their bond debt relative to assets exceeded 25% a quarter before Marblegate. Controls for firm dynamics include eight lags of the bond issuance indicator, lagged Tobin’s $Q$, the lagged level and the year-on-year change of the liquid asset ratios. Industry refers to 2-digit NAICS sectors. Standard error in parentheses clustered at the firm level. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

An alternative way to test the effect of Marblegate on bond issuance is to examine loan-bond substitutability directly, which I will do in the next and last subsection.

3.5.3 Marblegate and bank loan substitutability

Becker and Ivashina (2014) documented firms turning to the bond market as a “spare tire” (Greenspan, 1999) to mitigate adverse credit supply shocks from distressed banking systems. If Marblegate changed

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60 Further robustness checks can be found in Appendix Tables A.4.
the default or moral hazard cost of bond finance, the ruling should also have changed its appeal for smoothing out adverse bank loans shocks at the margin.

To test this, I identify banking relationships for compustat firms via DealScan and measure lenders’ balance sheet shocks from SNL data. Specifically, I estimate the effect of the relationship lender’s non-performing loan ratio—conditional on past dynamics in both non-performing loans as well as the market-to-book ratio to identify the effect of quarterly innovations to balance sheet health—on future bond issuance using the following panel regression:

\[
\text{I}(\text{issuance}_{f,q+1}, \text{issuance}_{f,q+2}) = \phi_f + \tau_q + \beta_1 \lambda_{f,q} + \beta_2 (M_q \times \lambda_{f,q}) + \mathbf{x}_{f,q} \gamma + e_{f,q} \tag{19}
\]

where \( \text{I}(\text{issuance}_{f,q+1}, \text{issuance}_{f,q+2}) \) assumes a value of 1 when the firm issues bonds of at least 5% of book asset value during either of the next two quarters. \( \lambda_{f,q} \) measures the share of non-performing loans at the firm’s relationship lender. As before, \( \phi_f, \tau_q, M_q \) denote firm fixed effects, quarter fixed effects and a dummy marking the Marblegate period. \( \mathbf{x}_{f,q} \) controls for lender dynamics in non-performing loan and market-to-book ratios over the past year as well as firm-level dynamics including dummies for bond issuance during the past three years and dynamics in leverage, bond leverage and Tobin’s Q over the past year.

Note how this specification allows to test predictions about the effect of the Marblegate ruling without relying on neither i) the precise date of the verdict nor ii) possibly endogenous measures of bond intensity or default risk.

Estimation results are presented in Table 4. Importantly, column (1) confirms that firms increased the probability of future bond issuance after relationship lender balance sheets got hit by an adverse shock;\(^{61}\) by about 9 pp. over the next two quarters in response to a 3 pp. increase in the non-performing loan ratio. However, this no longer holds true after Marblegate, when the response of bond issuance became essentially mute. Reassuringly, this pattern is entirely driven by risky firms, i.e., those actually exposed to the Marblegate ruling. As also documented by Becker and Ivashina (2014), safe firms barely react to lender distress even prior to Marblegate.

Column (4) reports estimates from an analogous regression where the dependent variable is replaced by capital expenditures over the next two quarters, normalized by next quarter’s assets, conditional on additional controls for dynamics in investment rates over the past year. Results are consistent with the interpretation that poorer substitutability of bank loans upon lender distress also worsen effects on real investment.

\(^{61}\)This finding also indicates that changes in the relationship lender’s non-performing loan ratio are not driven by distress at—and hence are exogenous to—the firm itself.
Table 4: Marblegate and the impact of relationship lender distress on bond issuance

<table>
<thead>
<tr>
<th></th>
<th>(1) Full sample</th>
<th>(2) Risky firms</th>
<th>(3) Safe firms (placebo)</th>
<th>(4) Capex, risky firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marblegate × Lender distress</td>
<td>-2.43*</td>
<td>-6.37**</td>
<td>-0.23</td>
<td>-0.48*</td>
</tr>
<tr>
<td></td>
<td>(1.19)</td>
<td>(2.22)</td>
<td>(1.58)</td>
<td>(0.26)</td>
</tr>
<tr>
<td>Lender distress</td>
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<td>6.67***</td>
<td>0.88</td>
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<td>(1.34)</td>
<td>(1.90)</td>
<td>(2.55)</td>
<td>(0.30)</td>
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<td>Yes</td>
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<td>0.10</td>
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<td>2447</td>
<td>2153</td>
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Notes: Estimates of Equation (19) for rated compustat non-financial firms over the period 2013Q1 to 2016Q4. Column (2) restricts the sample to firms with a S&P rating of BB+ or worse. Column (3) restricts the sample to firms with a S&P rating of BBB- or better. Column (4) replaces the dependent by capital expenditures over the next two quarters, normalized by next quarter’s assets and adds controls for dynamics in investment rates over the past year. The binary variable Marblegate indicates quarters 2015Q1-2016Q4. Lender distress is measured by the ratio of non-performing loans. Lender controls filter dynamics in non-performing loan and market-to-book ratios over the past year. Firm-level controls include dummies for bond issuance during the past three years and dynamics in leverage, bond leverage and Tobin’s Q over the past year. Standard error in parentheses clustered at the firm level. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

4 Conclusion

The financial inflexibility of market debt is a central assumption in a long tradition of scholarship in corporate finance and macro-finance (e.g., Bolton and Scharfstein, 1996; Bolton and Freixas, 2000; Boot, 2000; Hackbarth et al., 2007; Berglöf et al., 2010; Crouzet, 2018). I highlight its sensitivity to legal design: Poorly-coordinated market creditors will impede negotiations to the extent that they command relevant legal rights. It is no coincidence that US bond markets, providing empirical inspiration for the aforementioned assumption, are governed by particularly strict bondholder protection since the Trust Indenture Act of 1939. There have been various proposals to reform the mode of bond debt restructuring in the US (National Bankruptcy Conference, 2015; Roe, 2016; Bratton and Levitin, 2018).

I argue that market creditor rights can affect corporate discount rates: by counterbalancing ex-ante moral hazard cost with ex-post cost of restructuring, they shape the use of market debt, which can spare firms the agency frictions of relationship finance. At the heart of these forces is the inherent dispersion of market creditors, which inhibits them monitoring insiders while bloating coordination frictions in reorganization. While market creditor protection can limit insider moral hazard, the difficulty to
regulate out-of-court debt resolution can entrap creditor protection in adverse side effects of elevated distress resolution costs. In theory, these two countervailing forces are economically considerable under plausible parameter calibrations.

I provide evidence that the latter effect dominates in the aggregate under current US institutions. In response to recent shift in arm’s-length bondholder rights, distressed firms needed to offer more generous terms in out-of-court bond exchanges—or resolve bond debt through costly court procedures instead. Consistent with that, I document negative effects on corporate bond issuance and investment rates among healthy corporations. Despite the marginal nature of the institutional change, economic repercussions are sizable, hinting at the profound impact of market creditor rights on the economy.

References


APPENDIX

I Model details

The competitive bond market will absorb newly issued bonds at a price that equals expected, discounted repayments:

$$P(a_t, K_t, B_t, M_t^*) = \frac{1}{\rho_t} \left( p(a_t, M_t^*) \left( \mathbb{1}(V(K_t, B_t, \pi) > V_C(K_{t-1}, \pi)) \frac{\tilde{B}(K_t, B_t, \pi)}{B_t} \right. \right. 
+ \left. \left. \mathbb{1}(V(\cdot) = V_C(\cdot)) \frac{V(K_{t-1}, 0, \pi)(1 - \beta) - V_C(K_{t-1}, \pi)}{B_t} \right) \right. 
+ \left. (1 - p(a_t, M_t^*)) \left( \mathbb{1}(V(K_t, B_t, a) > V_C(K_{t-1}, a)) \frac{\tilde{B}(K_t, B_t, a)}{B_t} \right. \right. 
+ \left. \left. \mathbb{1}(V(\cdot) = V_C(\cdot)) \frac{V(K_{t-1}, 0, a)(1 - \beta) - V_C(K_{t-1}, a)}{B_t} \right) \right) \right)$$

(I.1) Details on model implications

Market creditor rights and ex-post cost of default To understand effect of out-of-court market creditor protection on ex-post cost of default, consider equation (9) together with the simplified version of the Bellman equation:

$$V(K_{t-1}, B_{t-1}, a_t) = \max \left\{ V_C(\cdot), V(K_{t-1}, 0, a_t) - \tilde{B}(\cdot) \right\}$$

(21)

If $\tilde{B}(\cdot) = B_{t-1}$, there is no need for debt restructuring, and nobody has the incentives to file for bankruptcy. Otherwise, there are three qualitatively distinct cases. In the first, legal constraints are too lax to affect out-of-court bond exchanges such that bondholder will receive exactly their bankruptcy reservation value:

Unconstrained bond exchange: $\tilde{B}(\cdot) = V(K_{t-1}, 0, a_t)(1 - \beta) - V_C(K_{t-1}, a_t)$

(22)

Plugging this into equation (21), clarifies that insiders will not want to file for bankruptcy in this case (while bondholders are indifferent). In particular, insiders are able to extract extra value equal to the dead-weight loss of bankruptcy.

In the second case, laws constrain out-of-court bond exchanges, but the additional value which bondholders receives is less than the bankruptcy dead-weight. Hence, insiders still benefit from restructuring bond debt out-of-court relative to a bankruptcy filing:

Constrained bond exchange: $\tilde{B}(\cdot) = \Lambda B_{t-1} \leq V(K_{t-1}, 0, a_t) - V_C(\cdot)$

(23)

Finally, if bondholder protection is too strong for the prevailing circumstances of a distressed firm, out-of-court bond exchanges would have to grant bondholders a recovery which leaves insiders with
less value than what they can expect to obtain in court. That is, market creditor rights inflict additional cost of default by prompting insiders to file for a bankruptcy procedure, as made explicit when plugging in the relation below into Equation (21):

\[
\text{Over-constrained bond exchange: } \tilde{B}(\cdot) = \Lambda B_{t-1} > V(K_{t-1}, 0, a_t) - V_C(\cdot) \tag{24}
\]

**Market creditor rights and ex-ante discipline**  
To understand how out-of-court market creditor rights can reign in on moral hazard and promote market bond issuance, start by considering the response of insider value to additional market debt:

\[
\frac{\partial V}{\partial B_t} = \frac{\partial P(\cdot) B_t}{\partial B_t} + \frac{\partial P(\cdot) B_t}{\partial M^*} \frac{\partial M^*}{\partial B_t} + \frac{1}{\rho_t} \left[ p(a_t, M_t) \frac{\partial V(\cdot, \bar{\pi})}{\partial B_t} \left(1 - p(a_t, M_t)\right) \right] \frac{\partial V(\cdot, a_t)}{\partial B_t} \tag{25}
\]

Putting changes in governance aside for the moment, the bond pricing equation (20) implies that additional value market creditors expect to receive tomorrow equals the value insiders expect to loose—as long as there will be no bankruptcy. However, note the difference in discounting:\(^2^2\)

\[
\text{if } V(\cdot, a_t) \geq V_C(\cdot, a_t) \forall a_t \in \{a, \bar{a}\} : \quad \frac{\partial P(\cdot) B_t}{\partial B_t} = -\frac{1}{\rho_t} \left[ p(a_t, M_t) \frac{\partial V(\cdot, \bar{\pi})}{\partial B_t} + \left(1 - p(a_t, M_t)\right) \frac{\partial V(\cdot, a_t)}{\partial B_t} \right] \tag{26}
\]

As soon as the next unit of market debt pushes insiders’ future value of operation (in state of low profitability) marginally below their bankruptcy reservation value \(V_C\), market creditors anticipate potential dead-weight losses from bankruptcy, provoking to a non-continuous drop-down in market debt prices, i.e., an infinite slope. Absent bankruptcy risk, plugging (26) into (25) yields

\[
\frac{\partial V}{\partial B_t} = \begin{cases} \left( \frac{1}{\rho_t} - \frac{1}{\rho_h} \right) \left[ p(a_t, M_t) \frac{\partial V(\cdot, \bar{\pi})}{\partial B_t} + \left(1 - p(a_t, M_t)\right) \frac{\partial V(\cdot, a_t)}{\partial B_t} \right] + \frac{\partial P(\cdot) B_t}{\partial M^*} \frac{\partial M^*}{\partial B_t} & \text{if } \frac{\partial P(\cdot) B_t}{\partial M^*} < 0 \\ 0 & \text{if } \frac{\partial P(\cdot) B_t}{\partial M^*} \geq 0 \end{cases} \leq 0
\]

Under bankruptcy risk, the first summand becomes negative for non-negligible bankruptcy dead-weight because market creditors will receive less in expectation than insiders pay out. Taken together, insiders will issue market debt until the risk of bankruptcy looms—except moral hazard, \(\frac{\partial M^*}{\partial B_t} < 0\), drives down the price of market debt too much before that point.\(^2^3\)

What determines the magnitude of moral hazard effects? Consider how the optimal insider effort, \(M^*\), changes with market bond issuance (at some interior point, i.e., \(M^* > 0\)):

\[
\frac{\partial M^*}{\partial B_t} = \frac{\gamma(a_t)(1 - \pi)}{\rho_t A \left( V(K_t, B_t, \bar{\pi}) - V(K_t, B_t, a_t) \right)} \frac{\partial V(K_t, B_t, \bar{\pi})}{\partial B_t} - \frac{\partial V(K_t, B_t, a_t)}{\partial B_t} \tag{27}
\]

\(^2^2\)This logic compels insiders to issue market debt in the first place, because insiders face higher opportunity cost of funds and their future value shrinks in today’s bond issuance today.

\(^2^3\)Remember that market creditors will anticipate any moral hazard and demand yield compensation today, by lowering the price at which they are willing to buy newly issued market debt.
If the firm operates, i.e., $K_t = 0$, the radicand will be finite and strictly positive such that the strength of moral hazard is determined by the differential effect of bond debt on either future state. Specifically,

$$
\frac{\partial V(\cdot, a_t)}{\partial B_t} = \begin{cases} 
-\frac{\partial B(\cdot, a_{t+1})}{B_t} & \text{if } V(\cdot) > V_C(\cdot) \\
0 & \text{else}
\end{cases}
$$

Considering equation (9), market debt repayment will react one-for-one to bond issuance in financially healthy states where market debt is honoured in full. By contrast, it will increase by only $\Lambda \in [0, 1]$ if regulation binds and will not react at all if debt exchanges occur in unconstrained fashion. Moreover, note that bankruptcy occurs in the good state only if would also take place in the bad, while dead-weight cost will always deter the firm from issuing so much bond as to trigger bankruptcy in all states. Hence, the differential effect of market debt on future values will be zero if market debt is sufficiently small so that it can be honoured in full in both states. For all intermediate levels, the differential effect of bond debt on future states will be negative and equal $-A$ under unconstrained debt exchanges and $-A(1 - \Lambda)$ for constrained or over-constrained debt exchanges. That is, as market creditor rights bind and tighten, moral hazard shrinks towards zero, increasing market debt issuance.

Note that the value of market debt issuance changes with $\Lambda$ only due to moral hazard. This will lead to a non-monotone reaction to expanding market creditor rights: Once moral hazard is shrunk beyond the state-specific threshold, firms will lever up with bond debt until the next unit would provoke bankruptcy dead-weight costs. Ultimately, the jump is due to the discrete nature of the profitability state space carrying positive point masses. A continuum of profitability states, by contrast, would imply some continuum of thresholds such that effects on market debt issuance cumulate continuously with growing $\Lambda$.

**Market debt and investment** To understand how exactly bond finance can spur additional investment, consider how insider value changes with additional investment while assuming for now that insiders will not want to file for bankruptcy in $t$ nor in either state of $t + 1$:

$$
\frac{\partial V}{\partial K_t} = -1 + \frac{1}{\rho_i} \left[ p(a_t, M_t) \frac{\partial V(\cdot, \pi)}{\partial K_t} + \left( 1 - p(a_t, M_t) \right) \frac{\partial V(\cdot, a)}{\partial K_t} \right] + \frac{\partial P(\cdot) B_t}{\partial K_t} + \frac{\partial P(\cdot) B_t M^*}{\partial M^*} \frac{\partial M^*}{\partial K_t}
$$

Using an argument similar to that underlying Equation (26), bondholders can expect to receive what insiders expect to give up—or less, in case of bankruptcy. That is, there is equivalence in the first order conditions up to the discount factor—with a discontinuity around bankruptcy, where the derivative becomes $\infty$. Hence, analogous to before, but implicitly allowing for bankruptcy as indicated by the

---

64Theoretically, market debt may be so large as to trigger debt resolution in both states, in which case the differential effect of market debt on future values will be zero as well. For $\alpha \in (0, 1)$, this would lead to bond-to-asset ratios of above 1. These equilibria are infeasible if insider governance is sufficiently sufficiently sensitive, i.e., moral hazard is non-negligible, see Equation (25).
The inequality:

\[
\frac{\partial V}{\partial K_t} \geq -1 + \frac{1}{\rho_t} \left[ p(a_t, M_t) (\alpha \alpha K_t^{\alpha-1} + 1 - \delta) + \left( 1 - p(a_t, M_t) \right) \left( \alpha \alpha K_t^{\alpha-1} + 1 - \delta \right) \right] 
\]

\[
+ \left( \frac{1}{\rho_b} - \frac{1}{\rho_i} \right) \left[ p(a_t, M_t) \frac{\partial \bar{B}(\cdot, \pi)}{\partial K_t} + \left( 1 - p(a_t, M_t) \right) \frac{\partial \bar{B}(\cdot, \pi)}{\partial K_t} \right] + \frac{\partial P(\cdot)}{\partial M^*} \frac{\partial M^*}{\partial K_t} B_t
\]

Baseline marginal value

Additional marginal value from bonds

That is, bond issuance makes investment more valuable because it effectively applies a higher discount factor to the portion of the continuation value which is pledged to outside market creditors—or even averts bankruptcy. In addition, investment functions as commitment device attenuating moral hazard associated to outstanding market debt.\(^65\)

In the model, marginal value of investment related to the discount rate differential may disappear in some states, e.g., when there is no restructuring in the high-profitability and constrained restructuring in the low-profitability state. However, this is an artefact of a discrete profitability state space. Under continuous profitability state—i.e., a probability-weighted integral inside the square brackets of the lower term—there would always be some state with unconstrained bond exchanges. Hence, future bondholder values, and thus current bond prices, would always be sensitive to investment policy.

**How market creditor rights ultimately increase investment** For sufficiently small levels of \(\Lambda\), bond restructuring (in the poor profitability state) will be unconstrained. The exact level is determined by the balance between the value of substituting insider finance on the one hand and the moral hazard effects scaled by the sensitivity of bond prices to success probability in turn scaled by the sensitivity of success probability to governance on the other. There will be some equilibrium bond exchange hair-cut \(x\) such that from \(\Lambda = x\) onward, exchanges become constrained and abruptly shrink the negative effect of moral hazard from \(-A(1 - 0)\) to \(-A(1 - \Lambda)\). The marginal benefit of issuing bonds jumps up, remaining positive until bond debt becomes so large as to threaten bankruptcy (in the poor profitability state) next period. Yet, exchange offers start becoming attractive in the other state, (re-)activating the

\(^{65}\)Note that

\[
\frac{\partial \bar{B}(K_t, B_t, a_{t+1})}{\partial K_t} = \begin{cases} 
0 & \text{if no haircut, i.e., } B(K_t, B_t, a_{t+1}) = B_t \\
(1 - \beta) (\alpha a_{t+1} K_t^{\alpha-1}) - \omega & \text{if unconstrained, i.e., } B_t > B(K_t, B_t, a_{t+1}) > \Lambda B_t \\
0 & \text{if constrained, i.e., } B_t > B(K_t, B_t, a_{t+1}) = \Lambda B_t
\end{cases}
\]

as well as

\[
\frac{\partial M^*}{\partial B_t} = A \left( \frac{\partial V(K_t, B_t, \pi)}{\partial K_t} - \frac{\partial V(K_t, B_t, \omega)}{\partial K_t} \right) 
\]

\[
= A \left( \alpha K_t^{\alpha-1}(\alpha - \omega) + \frac{\partial \bar{B}(\cdot, \pi)}{\partial K_t} - \frac{\partial \bar{B}(\cdot, \pi)}{\partial K_t} \right)
\]

\[
> 0
\]
bond-related marginal value of investment and thus prompting capital to grow as long as bondholder recovery is sensitive to investment.\footnote{If bankruptcy dead-weight loss is sufficiently small or profitability states sufficiently far apart, the process may not trigger that intermediate stage and thus leave the capital stock unchanged. However, this is an artefact of only modelling two profitability states: Generally, growing bond debt triggers unconstrained restructuring—activating the additional value for ex-ante investment—in the future state neighbouring the constrained state in terms of profitability. As the set of profitability states grows to infinity, the minimal bankruptcy dead-weight loss thus shrinks to zero.} The motion comes to a halt once the volume of market leverage hits the bankruptcy boundary.

The non-monotone increase in bond issuance and investment roots in the discrete nature of the profitability state space. By contrast, a continuum profitability states implies some continuum of thresholds \( \{x_j\} \). When \( \Lambda \) passes the next threshold, effects on bond issuance and investment cumulate continuously.

### I.2 Numerical implementation

I solve the model using value function iteration, plugging the closed-form solution for \( M^* \) of Equation (11) into bondholders willingness to pay given by Equation (20).\footnote{Value function iteration alone would be insufficient without a closed-form solution of \( M^*_t \). That is, for other functional forms of \( c(M_t) \) and \( p(M_t) \) that do not permit such a solution, value function iteration would be conditional on a (state-dependent) guess for \( M^*_t \) and have to be wrapped into an outer numerical root finding procedure for the equilibrium effort policy. Legacy code for this solution approach is stored in module ./compute/theory/model_armslength_dynamic/modules/_archive/twoStage/}

1.) Stipulate investor beliefs about the effort policy \( M^*_t(B_{t-1}, K_{t-1}, a_t) \). (Possibly use the fact that in a simple version of the model policies will be state-independent, i.e., constant across states.)

2A.) Find the corresponding (firm insider) policy mapping based on value function iteration.

2.1) Guess a value function.

2.2) Given investor beliefs and value function guess, compute the right-hand side of the Bellman equation (7) for all states \((K_{t-1}, B_{t-1}, a_t)\) to obtain new value function.

○ Iterate until the maximal absolute discrepancy between guessed and resultant value function falls below a (small) threshold.

2.3) Obtain policy mapping for final value function and stipulated investor beliefs.

2B.) Find the corresponding (firm insider) policy mapping based on numerical root finding (this guards against non-convergence in the iteration, but is computationally much more expensive of course).

2.1) Guess a value function.

2.2) Given investor beliefs and value function guess, compute the right-hand side of the Bellman equation (7) for all states \((K_{t-1}, B_{t-1}, a_t)\).

2.3) Calculate the absolute discrepancy in the Bellman equation across all states, take maximum.

○ Repeat with procedure (Broyden) numerically minimising the maximal absolute value function discrepancy.

2.4) Obtain policy mapping for final value function and stipulated investor beliefs.

3) Compute maximal absolute discrepancy between actual effort policy and corresponding investor beliefs.
1) Guess a value function (stipulate the terminal value function $V(\cdot) = 0$).

2) Compute the right-hand side of the Bellman equation (7), including $M^*$, for all states $(K_{t-1}, B_{t-1}, S_{t-1}, a_t)$ to obtain a new value function.

○ Iterate until the maximal absolute discrepancy between guessed and resultant value function falls below a (small) threshold.

3) Obtain policy mapping for final value function.

I.3 Calibration

Table A.1 shows the calibration of the 13 parameters. Where applicable, I target related moments from risky compustat firms (S&P entity rating BBB- or worse), using a full decade of data, 2010Q1-2019Q4, to capture a robust number of extreme profitability observations.

$\rho_b$ is set to 1%, slightly above the three-month US Treasury bill rate around the Marblegate ruling.

$\beta$ is set to 0.05, consistent with empirical evidence on total direct and indirect costs of bankruptcy, estimated to range between 1% and 20% of the firm’s going concern value (Hotchkiss et al., 2008; Lubben, 2012; Epaulard and Zapha, 2022).

$\delta$ is set to the empirical average quarterly depreciation rates of 0.013.

$\theta$ is set to 0.01, consistent with an asset liquidation value of about 40% in an “orderly liquidation process” spanning three quarters (Kermani and Ma, 2022).

$\omega$ is set to 0.289, the average volume of secured loans relative to assets at the eve of a bankruptcy filing in compustat data.

The following parameters are calibrated jointly to match the moments shown in the main text Figure 2, i.e., average bonds-to-assets ratio, average profitability as well as its dispersion across states, the probability to transition from the high into the low profitability state and the duration distribution of low-profitability spells. Each parameter affects certain model features more than others.

$\rho_i$ is set to $\rho_b + 10$ basis points, primarily targeting the average bond share

$\alpha$ is set to 0.85, primarily targeting average profitability\(^{68}\)

○ Repeat with procedure to minimising the maximal absolute discrepancy in policies (either Broyden or, under state-independent policies, loop through all points on the $M$ grid.).

\(^{68}\)Existing structural estimates have found the curvature of operating profits to be 0.55 (Hennessey and Whited, 2005). However, these models featured constantly changing profitability which renders the capital stock generally suboptimal, reducing profit rates. By contrast in my model, firms eventually hit the optimal capital stock and stick with it for a potentially long time. These models were also estimates on annual data.
$\pi, a$ are set to 0.02 and -0.10, primarily targeting the dispersion of profitability (while generating the need for debt restructuring, without which the model would be uninteresting)

$\pi, \gamma$ are set to 0.195 and $\infty$ primarily targeting the duration distribution of spells of low profitability

$\gamma$ is set to $1 \times 10^{-6}$, primarily targeting the probability to transition from high to low profitability

$\Lambda$ is set to 0.57, primarily targeting the average bond share

### Table A.1: Parameter calibration values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
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<td>$\rho_b$</td>
<td>Market discount rate</td>
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</tr>
<tr>
<td>$\rho_i$</td>
<td>Insider discount rate</td>
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</tr>
<tr>
<td>$\alpha$</td>
<td>Profit curvature</td>
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</tr>
<tr>
<td>$\delta$</td>
<td>Depreciation rate</td>
<td>0.0130000</td>
</tr>
<tr>
<td>$\theta$</td>
<td>Ease of liquidation</td>
<td>0.0100000</td>
</tr>
<tr>
<td>$\pi$</td>
<td>Base success probability</td>
<td>0.1950000</td>
</tr>
<tr>
<td>$\pi_a$</td>
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<tr>
<td>$a$</td>
<td>Low profitability</td>
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<td>$\gamma$</td>
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<tr>
<td>$\Lambda$</td>
<td>Out-of-court market creditor rights</td>
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<tr>
<td>$\omega$</td>
<td>Share of senior insider claims</td>
<td>0.2890000</td>
</tr>
<tr>
<td>$\beta$</td>
<td>Bankruptcy dead-weight loss</td>
<td>0.0500000</td>
</tr>
</tbody>
</table>

*Notes: All model parameters alongside short description and the value set during calibration to match data moments.*

### I.4 Additional results and predictions

Analogous to Figure 3 in the main text, Figure A.1 presents the comparative statics with respect to market creditor protection $\Lambda$ for additional model variables: Total firm value $V(K_{t-1}, 0, a_t)$ (i.e., its going concern value), bond intensity $B_t/K_t$, governance costs $M_t$ and the bond issuance price $P(\cdot)$. 

A7
II Model of bond restructuring with asymmetric information

In this section, I illustrate theoretically i) how an coalition of debtor and relationship creditors can extract information rents from restructuring arm’s-length debt, ii) why these information rents can undermine investment success and iii) clarify under which assumptions law should protect arm’s-length creditors out-of-court and by how much. The model builds on the following key notions:

1. Arm’s-length creditors hold significantly less information about business prospects than the debtor and its relationship creditors, which I will refer to as “insiders”. This can result in a transfer of value from arm’s-length creditors to insiders when debt needs to be restructured.

2. Information rents make the state of financial distress less dreadful for insiders, undermining incentives to exert managerial effort (debtor) and engage in costly monitoring (relationship creditors). At the same time, arm’s-length creditors demand compensation through higher rates ex-ante, making investment success—where arm’s-length debt obligations are honoured in full—less attractive. Both forces dis-incentivise insiders to implement costly (but efficient) measures maximising the investment’s net present value (NPV).
3. Insiders cannot commit ex ante to forego information rents ex post. Contracts are incomplete and arm’s-length creditors face prohibitive frictions in adjusting contracts ex-post. Emerging contractual loopholes allow insiders to undermine and hollow-out protective provisions possibly stipulated ex ante.

**Investment choice** Consider a single-project firm that requires a fixed amount $\alpha$ of arm’s-length credit to pursue an investment opportunity. Other financing is provided by insiders: firm owners and relationship creditors. To focus the analysis, I abstract from agency frictions between insiders. That is, I assume that they share value accruing to the group as a whole in a way that aligns individual incentives with the objective of maximising total group value.\(^{69}\)

Insiders maximise their expected value $E[V_i(\cdot)]$ choosing management and monitoring strategies $m$ and gross return to arm’s-length credit $R_a$. To supply $\alpha$, creditors must cover their opportunity cost of funds $\rho$ in expectation. Because arm’s-length creditors do not acquire insider information, they effectively cannot contract on management or monitoring $m$. Instead, they will anticipate insiders’ equilibrium choice $m^*$:\(^{70}\)

$$\max_{m,R_a} E[V_i(m, R_a)] \quad \text{s.t.} \quad E[V_a(m^*, R_a)] \geq \rho \alpha$$

(28)

The following assumptions clarify the structure and distribution of $V_i(\cdot)$ and $V_a(\cdot)$.

**Investment outcomes and information structure** Investment success depends on management and monitoring $m$ as well as unobserved factors. Agents learn the investment outcomes after the implementation of $m$ and common ex ante beliefs about the distribution of unobserved factors imply a success probability of $p(m)$ and a failure probability of $1 - p(m)$. Success yields cash flows $\Phi$ while failure cash flows $\phi$ fall between $\phi$ and $\tilde{\phi}$ with uniform probability. The variability of $\phi$ is key: While everybody is able to observe investment success and infers failure otherwise, arm’s-length creditors do not observe the exact realisation of $\phi$ upon failure: the actual extent of the economic malaise is insider information. Figure A.2 summarises key features of the investment process.

Management and monitoring $m$ is associated to cost $c(m)$ born privately by insiders. I assume that cost grow with management and monitoring quality, specifically:

$$p(m_1) > p(m_1) \implies c_i(m_1) > c_i(m_1),$$

(29)

\(^{69}\)The literature on conflicts between shareholders, management and creditors is vast and particular attention is given to information asymmetries and agency frictions between entities which I refer to as insiders in this paper. Without trivialising the economic importance of these frictions, my assumption rules out that they interact with arm’s-length creditor rights. Exploring such interactions appears to be an interesting route for future research. The notion that insiders share value in various states of the world is consistent with important practical features of distressed restructurings as well as bargaining power of relationship creditors over firm profits (Rajan, 1992).

\(^{70}\)This is the key characteristic of arm’s-length lending. No monitoring can be desirable because i) it taps the credit supply of dispersed investors each holding small positions due to a diversification objective given limited funds, making monitoring prohibitively costly or ii) to reduce ex-post hold-up associated to relationship lending (Rajan, 1992).
Figure A.2: Investment outcomes

\[
p(m) \quad \Phi \quad \text{("success")}
\]

\[
1 - p(m) \quad \phi \sim U(\phi, \overline{\phi}) \quad \text{("failure")}
\]

Perfect management and monitoring is infinitely costly, while insider behaviour without costs is completely ineffective:

\[
p(m) \to 1 \iff c_i(m) \to \infty \quad (30)
\]

\[
p(m) = 0 \iff c_i(m) = 0 \quad (31)
\]

**In-court debt restructuring** I assume that investment failure always implies insolvency by setting \( \phi < \rho \) such that available cash flows will always fall short of even the lightest contractual debt obligations that could possibly be compatible with creditor participation.

Insolvency can be resolved in front of a bankruptcy court at the cost of \( \delta \). In this case, the court learns the realisation of \( \phi \) and distributes value remaining after covering the verification costs \( \delta \) according to absolute priority

\[
\hat{R}_a \alpha = \phi - \delta, \quad (32)
\]

leaving \( \phi - \delta - R_a \alpha = 0 \) to firm owners. Naturally, I assume that the bankruptcy court can bind hold-outs and order arm’s-length creditors to relinquishing their original claims \( R_a \alpha \) and accept \( \hat{R}_a \alpha \).

Without loss of generality, I assume that \( \phi \geq \delta \), implying bankruptcy being always an economically viable option. Both insiders and arm’s-length creditors can initiate a bankruptcy procedure.

**Out-of-court debt restructuring** Insolvency can alternatively be resolved out-of-court through a private debt exchange offer. An out-of-court resolution saves the verification costs \( \phi \) of court procedures.\(^7\) Because arm’s-length creditors do not know the actual value of the firm \( \phi \), they would agree to exchange their claims \( R_a \alpha \) against devalued debt securities \( \tilde{R}_a \alpha \) if the value of new securities is greater or equal to what they can expect to extract from a bankruptcy process. Such debt exchanges face two complications.

First, I assume that arm’s-length creditors are dispersed in the sense of individually holding very small positions with prohibitively costly coordination. As a result, arm’s-length creditors have the incentive to free-ride on the debt hair-cuts of the others. Without coercion, all creditors will thus hold out, making

\(^7\)Thus, out-of-court resolution is always increases ex-post efficiency.
out-of-court restructuring infeasible. By contrast, if the firm is able to coerce hold-out creditors to accept a return of \( \Lambda \), offers \( \bar{R}_a \) become viable. I assume that \( \Lambda \) is set by the legislator ("arm’s-length creditor rights"). Arm’s-length creditors are always free to drag a failed firm before the bankruptcy court and realise \( \bar{R}_a = E_a[\phi] - \delta \). Hence, effective out-of-court coercion implies

\[
\bar{R}_a \geq \max \left( \Lambda, \frac{E_a[\phi] - \delta}{\alpha} \right)
\]  

(33)

Second, the fact that an offer \( \bar{R}_a \) is made can reveal information to arm’s-length creditors about \( \phi \). I denote the mapping between the state \( \phi \) and insiders’ choice to make an offer by the binary \( W(\phi) \in \{0, 1\} \). This information will update their expectations of bankruptcy payoffs and hence possibly shift effective out-of-court coercion, on which insiders depend to bind hold-outs. Arm’s-length creditors expect insiders to play the strategy that maximises their payoff. In equilibrium, thus, they know insiders’ mapping between \( \phi \) and \( (W, \bar{R}_a) \) and can use it to back-out information about \( \phi \). Ultimately, arm’s-length creditors are willing to leave value to insiders in exchange for saving bankruptcy cost \( \delta \). This ability of debt exchange offers to make arm’s-length creditors better off by saving the cost of formal bankruptcy procedure is what makes it viable and efficient.

**Payoff structure**  Based on assumptions above, agents form rational expectations about potential future payoffs at the time of contracting:

\[
E[V_i(m, R_a)] = p(m)(\Phi - R_a\alpha) + \left(1 - p(m)\right)E[W(\phi)(\phi - \bar{R}_a(\phi)\alpha)] - c_i(m)
\]  

(34)

\[
E[V_a(m^*, R_a)] = p(m^*)R_a\alpha + \left(1 - p(m^*)\right)E[W(\phi)\bar{R}_a(\phi)\alpha + (1 - W(\phi)) (\phi - \delta)]
\]  

(35)

**Solution and predictions**  The model can be solved via backward induction. Details are described in the following appendix subsection. The core implications of aforementioned assumptions are the following:

Upon investment failure and conditional on remaining value \( \phi \), the firm decides whether to make a debt exchange offer \( W(\phi) \) and if so, how generous it shall be \( \bar{R}_a(\phi) \). In equilibrium, arm’s-length creditors rationally anticipate insiders’ strategies \( W(\phi) \) and \( \bar{R}_a(\phi) \) and can use realisations to back-out information about \( \phi \). Hence, insiders will make the level of \( \bar{R}_a \) independent of \( \phi \) to reveal no information through the generosity of the exchange and fully extract its informational rent. For levels of \( \phi \) for which the equilibrium offer \( \bar{R}_a \) would induce losses, insiders will rather choose for file for bankruptcy \( W(\phi) = 0 \)—and receive nothing. Hence, the value offered has to be larger than what

---

72 \( \Lambda \) may vary with verifiable firm characteristics, such as its contractual structure. But cannot depend on \( \phi \) because the government and its courts do not know \( \phi \) (without incurring the bankruptcy cost \( \delta \)).

73 \( W = 0 \) implies resolution via the bankruptcy court.

74 Insider’s debt exchange policy will not involve mixing because of the following considerations: i) Any shift away from the optimal jump location in \( W(\phi) \) as well as any shift in the optimal \( \bar{R}_a \) yields lower payoff, hence, mixing such levels is
creditors can expect from bankruptcy conditional on the signal that an exchange offer has been actually made \((W(\phi) = 1)\).\(^{75}\) As I show in the appendix, insiders’ information rent—the value they can extract out-of-court although the firm is insolvent—equals

\[
\min \left( \delta, \frac{\bar{\phi} - \phi}{2} \right)
\]

that is, the firm’s information rent increases in the distance \((\bar{\phi} - \phi)/2\), i.e., the creditors’ uncertainty about the state, up to the full gain from avoiding bankruptcy, \(\delta\). In the extreme case of a degenerate distribution \((\bar{\phi} = \phi)\), there is no information asymmetry and hence no information rent.

Importantly, the legislator can redistribute the value of private debt workouts by changing \(\Lambda\). In the case that arm’s-length creditor rights \(\Lambda\) are strong enough \((\Lambda > E_a[\phi|W(\phi)] - \delta/\alpha)\), arm’s-length creditor recovery increases, eating into the information rents of insiders. Importantly, insiders will change when to offer to exchange debt in response, leading to fewer out-of-court restructuring and thus additional bankruptcy costs in expectation of

\[
\delta \left( \Lambda \alpha - \max(\phi, \bar{\phi} - 2\delta) \right) > 0
\]

The first-order conditions to the problem of choosing ex-ante business strategy and credit return then imply

\[
p'(m^*) \left( \Phi + \frac{(1 - p(m^*)-\rho\alpha}{p(m^*)} - V^f_i \right) = c'_i(m^*)
\]

\[
R_a^* = \frac{\rho\alpha - (1 - p(m^*)-\rho\alpha}{p(m^*)}
\]

Re-distribution of value from insiders to arm’s-length creditors in the state of investment failure increases the bracketed term in \((38)\). If \(p(\cdot)\) is more concave than \(c(\cdot)\)—common and plausible assumptions—the first order condition dictates an increase in the success probability \(p(\cdot)\). Intuitively, a more dreadful outcome upon investment failure incentivises insiders to exert privately costly effort to increase the probability of investment’s success. This is the key rationale for protecting arm’s-length creditor rights in out-of-court debt restructuring. There is a countervailing force, however. When the expected costs of bankruptcy filings increase by more than what arm’s-length creditors can expect to gain out-of-court, \(R_a\) has to rise ex-ante to compensate. This undermines the desirability of investment success from the point of view of insiders, discouraging effort and hence reducing the value of investment. Overall, protecting arm’s-length creditors may thus back-fire.

\(^{75}\)Arm’s-length creditors will in never play mixing strategies. For each creditor it is not individually rational to mix between tendering and taking the coercion pay-out \(\Lambda\). By assumption of dispersion, it is also no equilibrium to mix between tendering and filing for bankruptcy: Dispersion as assumed earlier prevents coordination and implies an infinite number of identical creditors and thus any mixing of bankruptcy implies bankruptcy with certainty.
To illustrate these forces, I use a numerical example based upon the following additional functional form assumptions with $b > 0$ and $\theta > 0$:

\[
p(b) = \frac{b}{1 + b} \quad \in [0, 1)
\]
\[
c(b) = \theta b \quad > 0
\]

The explicit model solution then allows to assess ex-ante expected values of investment $E[V_i(.)]$ across different calibrations of arm’s-length creditor protection $\Lambda$.\(^76\) Figure A.3 illustrates the trade-off for insider incentives set by arm’s-length creditor rights: Up to the point where arm’s-length creditor protection is sufficiently weak—i.e., out-of-court coercion is weaker than in-court coercion—private workouts are unaffected as shown by a flat expected investment value. In this calibration, arm’s-length creditor rights start to bite at $\Lambda = 0.8$. At first, the redistribution unfolds positive effects on insider incentives to labour for the investment’s success ex-post of contracting. However, when creditor protection start to frustrate too many private debt exchange offers, arm’s-length creditor’s gain on the surviving ones get swamped by the increasing dead-weight cost of bankruptcy—and lending rates grow again to the point where they revert insider incentives to labour for the good state (in which these high debt obligations are to be honoured in full).\(^77\)

II.1 Solution of the model with asymmetric information

The model can be solved via backward induction.

Investment outcome: Failure  Upon investment failure and conditional on remaining value $\phi$, the firm decides whether to make a debt exchange offer ($W(\phi)$) and if so, how generous it shall be ($\tilde{R}_a(\phi)$).

In equilibrium, arm’s-length creditors know the firm’s mapping between $\phi$ and $\tilde{R}_a$ and can use its to back-out information about $\phi$. Hence, the firm will make the level of $\tilde{R}_a$ independent of $\phi$ to fully extract its informational rent. For levels of $\phi$ for which the equilibrium offer $\tilde{R}_a$ induces losses, the firm will rather choose for file for bankruptcy ($W(\phi) = 0$)—and receive nothing.\(^78\) Hence, the value offered has to be larger than what creditors can expect from bankruptcy conditional on the signal that an exchange offer has been actually made. Adding the constraint of effectively feasible out-of-court coercion, such

\(^76\)Note that the net value of arm’s-length creditors $E[V_a(.)] - \rho a$ will be zero in equilibrium, such that the total value of investment and the incentive for the firm to undertake coincide.

\(^77\)Obviously, the size of possible gains depends on the calibration. In fact, under some constellations, gains can be enormous while for others, there never can be any benefits from additional legislative interference. That is, Marblegate might have benefited some firms and not others and the questions primarily concerns the average firm exposed to the verdict.

\(^78\)Firm’s debt exchange policy will not involve mixing because of the following considerations: i) Any shift away from the optimal jump location in $W(\phi)$ as well as any shift in the optimal $\tilde{R}_a$ yields lower payoff, hence, mixing such levels is suboptimal. ii) Any increase of $W(.)$ to values larger than 0 in regions where $\phi - \tilde{R}_a$ is negative, as well as and reductions in regions where $\phi - \tilde{R}_a$ is positive reduces the firm’s payoff. Hence, mixing such levels reduces payoffs as well.
an equilibrium strategy solves the following problem:\footnote{Arm’s-length creditors will in never play mixing strategies. For each creditor it is not individually rational to mix between tendering and taking the coercion pay-out $\Lambda$. By assumption of dispersion, it is also no equilibrium to mix between tendering and filing for bankruptcy: Dispersion as assumed earlier prevents coordination and implies an infinite number of identical creditors and thus any mixing of bankruptcy implies bankruptcy with certainty.}

\begin{align}
\max_{\tilde{R}_a \in \mathbb{R}_+} \max_{W(\phi) \in \{0, 1\}} \left( W(\phi)(\phi - \tilde{R}_a \alpha) \right) \\
\text{s.t.}
W(\phi)\tilde{R}_a \alpha \geq W(\phi) \left( E_a[\phi | W(\phi)] - \delta \right) \\
W(\phi)\tilde{R}_a \geq W(\phi) \max \left( \Lambda, \frac{E_a[\phi | W(\phi)] - \delta}{\alpha} \right)
\end{align}

Firm’s payoff strictly decreases in $\tilde{R}_a$, hence the first constraint will bind. Upon receiving an offer...
Given the first constraint, the second constraint either becomes redundant or will be binding for exchange offers. If the second constraint does not bind (and hence becomes redundant), the optimal generosity of debt exchange offers can be determined by substituting \(43\) into the first constraint (still with \(W(\phi) = 1\)):

\[
\begin{align*}
\text{If } \tilde{R}_a > \phi : &\quad \tilde{R}_a = \frac{\tilde{R}_a + 2}{2} - \delta \\
\iff &\quad \tilde{R}_a = \frac{\phi - 2 \delta}{\alpha} \\
\text{else } &\quad \tilde{R}_a = \max(\phi, \phi - 2 \delta)
\end{align*}
\]

For which \(\phi\) will the firm actually offer to exchange debt?

\[
W^*(\phi) = \mathbb{1}(\phi - \max(\tilde{\phi}, \phi - 2 \delta) > 0)
\]

That is, upon investment failure and under sufficiently weak arm’s-length creditor rights, firm owner can expect to extract an information rent of

\[
E[W^*(\phi)(\phi - \tilde{R}_a)] = E[(\phi - \max(\tilde{\phi}, \phi - 2 \delta) | \phi > \max(\tilde{\phi}, \phi - 2 \delta))] - \max(\tilde{\phi}, \phi - 2 \delta)
\]

\[
= \frac{\max(\tilde{\phi}, \phi - 2 \delta) + \phi}{2} - \max(\tilde{\phi}, \phi - 2 \delta)
\]

\[
= \frac{\phi - \max(\tilde{\phi}, \phi - 2 \delta)}{2}
\]

\[
= \min \left( \delta, \frac{\phi - \phi}{2} \right)
\]

That is, the firm can increase an information rent that increases in the distance \((\tilde{\phi} - \phi)/2\), i.e., the creditors’ uncertainty about the state, up to the full gain from avoiding bankruptcy. In the extreme case of a degenerate distribution \((\tilde{\phi} = \phi)\), there is no information asymmetry and hence no information rent.

---

\(^{80}\)Using that i) \(\phi\) is uniformly distributed, ii) in equilibrium, firms cannot offer less than \(\phi\) without provoking a bankruptcy filing by arm’s-length creditors.
In the case that arm’s-length creditor rights $\Lambda$ are strong enough ($\Lambda > E_a[\phi W(\phi)] - \delta/\alpha$), the second constraint will be binding (again, because firm’s payoff strictly decreases in $\tilde{R}_a$), implying

$$W(\phi) \tilde{R}_a = W(\phi) \Lambda \iff \tilde{R}^{**}_a = \Lambda$$

Specifically, arm’s-length creditor rights $\Lambda$ are “strong enough” if

$$\Lambda > \frac{\max(\phi, \tilde{R}^{**}_a) + \bar{\phi} - 2\delta}{2\alpha}$$

Intuitively, strong arm’s-length creditor rights increase their recovery ($\tilde{R}^{**}_a > \tilde{R}^*_a$), eating into the information rents of firm owners. Importantly, firms will also change when to offer to exchange debt:

$$W^{**}(\phi) = 1(\phi - \Lambda > 0)$$

Ultimately, the re-distributional effect comes at the expense of fewer out-of-court restructuring and thus additional bankruptcy costs in expectation:

$$\delta E[(1 - W^{**}(\phi)) - (1 - W^*(\phi))] = \delta E[W^*(\phi) - W^{**}(\phi)]$$

$$= \delta E[1(\phi - \max(\phi, \bar{\phi} - 2\delta) > 0) - 1(\phi - \Lambda > 0)]$$

$$= \delta E[1(\max(\phi, \bar{\phi} - 2\delta) < \phi < \Lambda\alpha)]$$

$$= \delta P(\max(\phi, \bar{\phi} - 2\delta) < \phi < \Lambda\alpha)$$

$$= \delta \left(\Lambda\alpha - \max(\phi, \bar{\phi} - 2\delta)\right) > 0$$ (49)

**Investment outcome: Success**  
Upon investment success, there are no choices and cash flows are distributed according to ex-ante contracts.

**Ex ante contracting and choice of business strategy**  
Because firm owners’ expected payoff strictly falls in $R_a$, they will offer interest such that arm’s-length creditors are just willing to lend, i.e., their participation constraints binds:

$$E[V_a(R_a, b^*, \sigma, \phi)] = \rho\alpha$$ (50)

Substituting transforms the firm’s ex-ante objective into

$$\max_b p(b) \left(\Phi - \frac{\rho\alpha - (1 - p(b^*)) V_a^f}{p(b^*)} + (1 - p(b)) V_e^f - c_e(b)\right)$$ (51)

Using that $\max(\phi, \Lambda\alpha) = \Lambda\alpha$ as otherwise the information set binds the firm’s exchange offer, not the law.
where $V_{a}^f$ and $V_{e}^f$ denote the expected payoffs in case of investment failure for both agent types, which are independent of $b$:

\begin{align}
V_{e}^f &= E \left[ W(\phi)(\phi - \tilde{R}_a(\phi)\alpha) \right] \\
V_{a}^f &= E \left[ W(\phi)\tilde{R}_a(\phi)\alpha + (1 - W(\phi)) (\phi - \delta) \right]
\end{align}

Using previous solutions on the firm’s debt exchange policy, these values can be expressed in terms of model parameters only. Recall that in equilibrium, offered amounts are actually independent of $\phi$. If arm’s-length creditor rights are sufficiently strong to affect out-of-court exchanges ($\Lambda > \max(\phi, \phi - 2\delta)/\alpha$), expected failure payoffs become

\begin{align}
V_{e}^f &= E \left[ W^*(\phi)(\phi - \tilde{R}_a^*(\phi)\alpha) \right] \\
&= \frac{\phi - \Lambda \alpha}{2} \\
V_{a}^f &= E \left[ W^*(\phi)\tilde{R}_a^*(\phi)\alpha + (1 - W^*(\phi)) (\phi - \delta) \right] \\
&= \Lambda \alpha \frac{\phi - \Lambda \alpha}{\phi - \phi} + \frac{\phi + \Lambda \alpha}{2} - \delta
\end{align}

otherwise they are

\begin{align}
V_{e}^f &= E \left[ W^*(\phi)(\phi - \tilde{R}_a^*(\phi)\alpha) \right] \\
&= \min\left(\delta, \frac{\phi - \phi}{2}\right) \\
V_{a}^f &= E \left[ W^*(\phi)\tilde{R}_a^*(\phi)\alpha + (1 - W^*(\phi)) (\phi - \delta) \right] \\
&= \max(\phi, \phi - 2\delta) \frac{\phi - \max(\phi, \phi - 2\delta)}{\phi - \phi} + \frac{\phi + \max(\phi, \phi - 2\delta)}{2} - \delta
\end{align}

First-order conditions pin down $b^*$ implicitly

\begin{align}
p'(b^*) \left( \Phi + \frac{(1 - p(b^*))V_{a}^f - \rho \alpha}{p(b^*)} - V_{e}^f \right) = c_e'(b^*)
\end{align}
III Auxiliary evidence

III.1 Macroeconomic tranquility

In its opinion underpinning the Marblack ruling, the court did not refer to an economic motive. Yet, macroeconomic shocks might coincidentally confound the effects of the verdict. Fortunately, Figure A.4 confirms that the macroeconomic environment was stable and healthy around the Marblack ruling at the end of 2014, right in the middle between the Great Financial Crisis and the Pandemic Recession.

Figure A.4: Macroeconomic environment around the Marblack ruling

(a) GDP growth

(b) Unemployment rate

Notes: Left panel shows year-on-year growth of quarterly real GDP measured by expenditure. Right panel shows monthly unemployment rate seasonally adjusted as reported by the U.S. Bureau of Labor Statistics. Red line marks date of the Marblack ruling.

III.2 Bond intensity and the propensity to issue additional bonds

Marblack changed (i) cost default cost and (ii) moral hazard risk associated with bond financing. Accordingly, firms heavily reliant on bonds should react the most. However, to facilitate empirical analysis it is important that observed bond intensity is predictive of future bond finance as well. Figure A.5 presents evidence in that vein. In particular, firms above median intensity—the cut-off used throughout the paper—are substantially and significantly more likely to issue bond in sizable volumes.
Figure A.5: Bond issuance probability by bond intensity

(a) Descriptive

(b) Panel regression

Notes: The left panel shows local averages by bond intensity for bond issuance, by size of issuance. Estimates are based on the cross-section of compustat firms of 2013. Bond issuance data matched from FISD. The right panel shows coefficients for dummies marking the full-sample distribution of bond intensity from a linear probability panel regression of future bond issuance of at least 5% of assets controlling 16 lags of past bond issuance as well as quarter and firm fixed effects. Effect for the first quartile is normalized to zero. Sample is 2010Q1 to 2018Q4.

III.3 Hold-outs in bond exchanges

At the time of the ruling, a wide-spread concern was that stronger protection would embolden minority bondholders to hold out of agreements, be it because they deemed the offer unfair or out of strategic considerations. Examining detailed information on distressed bond exchanges from Moody’s Default and Restructuring Database allows to shed light on whether hold-outs did indeed become more prevalent under the Marblegate regime. For each distressed bond exchange covered in the data, Figure A.6 shows that the volume of bonds being exchanged was indeed about 20 percentage points smaller under Marblegate, conditional on the recovery rate offered (x-axis). Note that unobserved selectivity of bond exchanges offers—only a subset of holders, such as “qualified institutional investors”, being eligible to participate—is unlikely to drive this result unless the data misspecifies the total volume of eligible bonds.
Figure A.6: Marblegate and bond exchange offer hold-outs

Notes: Recovery rate information for 130 out-of-court distressed bond exchanges between 1990 and 2020 in the US from Moody’s Default and Restructuring Database. Marblegate denotes the period between Dec 31, 2014 and Jan 16, 2017. Circle areas represent the total volume of debt outstanding before default.

III.4 Drop among bond-intensive firms or increase among control group?

The documented divergence in investment rates after the Marblegate verdict may in principle be driven by an investment rate cut among the exposed firms or an increase of investment rates among the less exposed firms (or any mix). The preferred interpretation that exposed firms were forced to deviate from their desired capital structure while others were much less affected would be harder to reconcile with the second case, however. To test, I examine the evolution of investment rates among the control group as estimated by the quarter fixed effects and compare it with the path of the treated firms by adding the treatment effect. Reassuringly, trajectories shown in Figure A.7 confirm that adjustments took place predominantly among the exposed firms.
Figure A.7: Marblegate’s effect on firm investment rates

(a) Risky firms

(b) Safe firms (placebo)

Notes: Estimates of average investment rates—net of firm-fixed effects—by quarter and bond intensity from Equation (16) within compustat non-financial firms. The left panel shows results for risky firms with a S&P high-yield rating. The right panel shows results for safe firms with a S&P investment-grade rating. Whiskers mark 95% CI for $\beta(q)$ based on standard errors clustered at the firm level.

III.5 Changes across the cash flow statement

Evidence in the main text suggests that Marblegate reduced capital expenditure cash outflows among exposed firms. Did it also affect financial investments? And how did firms balance the reduction in outflows: Did they increase cash buffers or did they cut financing inflows?

Examining the last question carries particular significance because it helps to evaluate whether investment cuts are driven by a precautionary motive rather than a shift in corporate discount rates. As Marblegate increased the cost of default, firms might become reluctant to convert safe liquid assets into illiquid investment lotteries. In the presence of financial constraints, such a precautionary motive could explain the cut in capital expenditure without any effect on corporate discount rates.

I ran regressions for different cash flow variables using the same specification as for investment rates

$$\frac{\text{CF}_{f,q}^{\text{assets}_{f,q-1}}}{\phi_f + \tau_q + \beta(M_q \times B_{f,2014Q3}) + \boldsymbol{x}_{f,q} \gamma + \epsilon_{f,q}}$$  (59)

where $\text{CF}_{f,q}^{\text{assets}_{f,q-1}}$ denotes either capital expenditures, net long-term financial investments, net total cash accumulation or net debt issuance. The vector of controls is analogous to the specification in the main text, including four lags of the dependent variable alongside lagged Tobin’s $Q$ and the interaction between the Marblegate dummy and the firm’s total leverage ratio in 2014Q3.

Table A.2 presents the estimates. Column (1) reproduces the main capex result for reference. Column (2) reports negative effects for net financial investments smaller than for capital expenditure but of similar order of magnitude. Importantly, column (3) and (4) document that there is virtually no effect on total cash accumulating and that all adjustments appear to be balanced by a reduction in net debt issuance. Taken together, these results corroborate the interpretation, that Marblegate increased effective
corporate discount rates by distorting debt structure choices, with negative consequences for firm investment.

### Table A.2: Marblegate’s effect across the cash flow statement

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Notes: Estimates of Equation (59) using compustat non-financial firms with a S&P rating of BB+ or worse. The sample period covers quarters 2013Q1 to 2016Q4. The binary variable Marblegate indicates quarters 2015Q1-2016Q4. Firms are considered to be “bond-intensive” if their bond debt relative to assets exceeded 25% a quarter before Marblegate. Firm-level dynamics measured by four lags of the dependent variable, lagged Tobin’s $Q$ and the interaction between the Marblegate dummy and the firm’s total leverage ratio in 2014Q3. Standard error in parentheses clustered two-way at firm and quarter level. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

### III.6 Bond pricing

I examine bond prices to see whether bond investors price the changes brought about by Marblegate. In particular, by restricting the possible set of exit-consent strategies, which would couple bond exchanges with a vote over stripping the original bond issue off protective guarantees or covenants, Marblegate should have increased the value of these provisions in the eyes of investors. To test this, I run an OLS regression of monthly bond returns on month fixed effects and the full set of their interactions with a dummy $G_b$ indicating the presence of a guarantee, insurance or letter of credit, as measured in FISD. To purge bond price from common movements in narrowly defined risk × maturity classes, I follow the literature and construct abnormal monthly bond returns $\tilde{R}_{bm}$ as the difference of a bond’s return above and beyond its benchmark portfolio. Monthly benchmark portfolio returns are constructed as the monthly average within a rating × maturity bin spanned by the rating classes AAA, AA, A, BBB, BB, B, CCC, CC and worse one the one hand and ten maturity classes on the other, yielding 90 different portfolios in total.\(^{82}\)

\[
\tilde{R}_{bm} = \tau_m + \beta(m)G_b + \epsilon_{bm} \quad (60)
\]

\(^{82}\)Maturity classes are 0-3 months, 3-12 months, 1-2 years, 2-3, 3-4, 4-5, 5-7, 7-10, 10-20 and above 20.
To prevent outlier returns from driving the OLS estimate, I winsorize the entire sample of abnormal returns by 1%. As common in the literature, I also restrict the sample of bonds to publicly traded, non-convertible, unsecured senior bonds issued by domestic non-financial firms before Dec 30, 2014 with remaining maturity of 12 to 120 months—however, non of these individual criteria turns out to be crucial for the estimates.

Figure A.8 presents the month-specific estimates of $\beta(m)$, normalized by the return in the month before the Marblogate verdict, November 2014. Recall that these estimate the difference in monthly returns between two bonds within the same rating × maturity class where one of the bonds is guaranteed by another entity (typically the parent) while the other is not. None of the estimates is significantly different from the average return in November—except during the months of the the Marblogate verdicts: December 2014 and June 2015. Consistent with the reading of secondary sources, the shock was larger in December 2015, raising monthly abnormal returns by as much as 50 basis points. By contrast, the final verdict in June 2015 was largely anticipated, showing a smaller excess impact on bond returns, which is barely significant at the 5% level.

Figure A.9 illustrates that these effects are indeed driven by risky bonds, consistent with the notion that Marblogate should have stronger effects on financial distress is more likely.

Figure A.8: Marblogate’s effect on bond pricing

Notes: TRACE-FISD sample of publicly traded, non-convertible, unsecured senior bonds issued by domestic non-financial firms before Dec 30, 2014 with remaining maturity of 12 to 120 months. Whiskers mark 95% CI based on robust standard errors clustered at the issuer level.
Figure A.9: Effects on bond prices are driven by high-yield bonds

\[
\gamma(m), \text{ base } 2014M11
\]

Notes: OLS estimates of the model \( \dot{R}_{bm} = \tau_m + b_m HY_{bm-1} + \beta(m)G_b + \gamma(m)(G_b \times HY_{bm-1}) + e_{bm}. \) HY_{bm-1} indicates bonds issues rated worse than BBB in the previous month. TRACE-FISD sample of publicly traded, non-convertible, unsecured senior bonds issued by domestic non-financial firms before Dec 30, 2014 with remaining maturity of 12 to 120 months. Whiskers mark 95% CI based on robust standard errors clustered at the issuer level.

### III.7 Robustness checks

Table A.3: Marblegate’s effect on investment across alternative specifications

<table>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
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<tr>
<td></td>
<td>W/o FE</td>
<td>B at 20%</td>
<td>B at 30%</td>
<td>B at 2013Q4</td>
<td>Trend</td>
<td>Excl. Oil</td>
</tr>
<tr>
<td>Marblegate × Bond-intensive</td>
<td>-0.0017***</td>
<td>-0.0032***</td>
<td>-0.0016***</td>
<td>-0.0032***</td>
<td>-0.0016***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0005)</td>
<td>(0.0011)</td>
<td>(0.0006)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Firm dynamics</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Quarter FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Level effects</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Average dependent</td>
<td>0.0161</td>
<td>0.0161</td>
<td>0.0161</td>
<td>0.0160</td>
<td>0.0161</td>
<td>0.0135</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.71</td>
<td>0.75</td>
<td>0.75</td>
<td>0.76</td>
<td>0.75</td>
<td>0.73</td>
</tr>
<tr>
<td>( N )</td>
<td>7710</td>
<td>7706</td>
<td>7706</td>
<td>7108</td>
<td>7706</td>
<td>7007</td>
</tr>
</tbody>
</table>

Notes: Estimates of Equation (17) using compustat non-financial firms. The dependent variables is capital expenditures rel. to assets last quarter. Sample includes compustat sample of non-financial firms with a S&P rating of BB+ or worse; except column (6), which in addition excludes firms engaged in oil or gas extraction, refinement or distribution. The sample period covers quarters 2013Q1 to 2016Q4; except for column (6) which adds two years thereafter. The binary variable Marblegate indicates quarters 2015Q1-2016Q4. Firms are considered to be “bond-intensive” if their bond debt relative to assets exceeded 25% a quarter before Marblegate; except in columns (2), (3) and (4) which use thresholds of 20% or 30%, or measure bond intensity a year before the verdict, respectively. Firm-level dynamics measured by four lags of the investment rate, four lags of the change in the debt-to-asset ratio and lagged Tobin’s \( Q \). Standard error in parentheses clustered two-way at firm and quarter level. *** \( p < 0.01 \), ** \( p < 0.05 \), * \( p < 0.10 \).
Figure A.10: Splitting firms according to quarter-specific bond intensity

Notes: OLS estimates of \( \frac{\text{capex}}{\text{assets}} f_{q} = \phi_f + \tau_q + \beta(q)B_f,q + e_{f,q} \). Compustat sample of non-financial firms with S&P investment-grade rating (BBB+ or better). Left panel illustrates how capex of bond-intensive firms drops relative to other firms after Marblegate verdict. Right panel plots average investment rates for each group. Whiskers mark 95% CI based on standard errors clustered at the firm level.
Table A.4: Marblegate’s effect on bond issuance under alternative assumptions

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<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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</thead>
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<tr>
<td></td>
<td>Any Issues</td>
<td>Issues &gt; 10%</td>
<td>$B\text{ at 20%}$</td>
<td>$B\text{ at 30%}$</td>
<td>$B\text{ at 2013Q4}$</td>
<td>Trend</td>
<td>Excl. Oil</td>
</tr>
<tr>
<td>Marblegate $\times$ Bond-intensive</td>
<td>-0.047***</td>
<td>-0.037***</td>
<td>-0.024***</td>
<td>-0.053***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.009)</td>
<td>(0.008)</td>
<td>(0.011)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marblegate $\times$ Bond-intensive $&gt;20%$</td>
<td>-0.045***</td>
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<tr>
<td></td>
<td>(0.010)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Marblegate $\times$ Bond-intensive $&gt;30%$</td>
<td>-0.045***</td>
<td></td>
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<tr>
<td></td>
<td>(0.012)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marblegate $\times$ Bond-intensive $2013Q4$</td>
<td>-0.061***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time trend $\times$ Bond-intensive</td>
<td>-0.003***</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
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<tr>
<td>Firm dynamics</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm FE</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Quarter FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Average dependent, bond-intensive</td>
<td>0.072</td>
<td>0.041</td>
<td>0.056</td>
<td>0.063</td>
<td>0.058</td>
<td>0.055</td>
<td>0.057</td>
</tr>
<tr>
<td>Average dependent, not bond-int.</td>
<td>0.028</td>
<td>0.014</td>
<td>0.017</td>
<td>0.027</td>
<td>0.028</td>
<td>0.020</td>
<td>0.023</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.17</td>
<td>0.14</td>
<td>0.16</td>
<td>0.16</td>
<td>0.17</td>
<td>0.12</td>
<td>0.16</td>
</tr>
<tr>
<td>$N$</td>
<td>8153</td>
<td>8153</td>
<td>8153</td>
<td>8153</td>
<td>7628</td>
<td>11764</td>
<td>7478</td>
</tr>
</tbody>
</table>

Notes: Estimates of Equation (18). Dependent variable is a binary indicator for a bond issuance >5% of assets, except columns (1) and (2) showing results for any bond issuance or those above 10% of assets, respectively. Sample includes Compustat sample of non-financial firms with a S&P rating of BB+ or worse; except for column (7), which in addition excludes firms engaged in oil or gas extraction, refinement or distribution. The sample period covers quarters 2013Q1 to 2016Q4; except for column (6) which adds two years thereafter. The binary variable Marblegate indicates quarters 2015Q1-2016Q4. Firms are considered to be "bond-intensive" if their bond debt relative to assets exceeded 25% a quarter before Marblegate; except in columns (3), (4) and (5) which use thresholds of 20% or 30%, or measure bond intensity a year before the verdict, respectively. Firm-level dynamic variables include eight lags of the dependent, lagged Tobin’s $Q$, four lags of real asset growth and four lags of sales growth. Standard error in parentheses clustered two-way on firms and quarters. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. 

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III.8 Effects of the Second Circuit ruling on Jan 17, 2017

The Marblegate verdict was filed for review at the Second Circuit Court of Appeals. In a contentious two-vs-one decision, the higher court overturned Marblegate on January 17, 2017, about two years after the original verdict. The Second Circuit ruling does not provide a policy shift as sharp as the original for three reasons. First, the Court of Appeals left uncertainty as to whether exit-consent transactions could target parent guarantees in the same way as they used to do (Millar, 2017; Bratton and Levitin, 2018). Second, market participants might have become wary about similar policy shifts of judge discretion in the future, given that the Second Circuit ruling was indeed not unanimous. Third, the anticipation effect as well as and adjustment measures undermine the statistical value of the January 2017 decision. Nevertheless, I repeat key analyses in this appendix, using January 17, 2017 as an additional treatment date.

Figure A.11 confirms that the elevated propensity to restructure distressed bond debt in bankruptcy indeed reverses after the Second Circuit ruling. The overall filing propensity is above the pre-Marblegate level in the lowest quartile of the Z-score distribution. But the ratio of filing rates across firms split by bond intensity is very similar again.

Figure A.12 extends the time horizon for the analysis of Equation (16), adding the two years after the Second Circuit ruling. Indeed, investment rates start reverting to their pre-Marblegate benchmark, becoming statistically indistinguishable from 2017Q3 onwards. The reversal is not as sharp as the original drop and point estimates never fully reach the pre-Marblegate benchmark by 2018Q4. This might reflect that the January 2017 ruling was perceived to not refute all aspects of the original reasoning in the Southern District of New York (Millar, 2017; Bratton and Levitin, 2018).

Similarly, Figure A.13 show quarter-specific bond issuance across the two firm sub-samples split by bond intensity. Estimates are subject to substantial noise given the low frequency of bond issuance, however, a consistent pattern emerges. Issuance rates for bond-intensive firms were below the control group during all quarters during the Marblegate regime except a spiky outlier in 2015Q2. During 2017, the pattern reverses again and issuance rates closely track each other thereafter.
Figure A.11: Maringlete overturning reduced bankruptcy filings by bond-intensive firms


Figure A.12: Maringlete's effect on firm investment rates beyond January 2017

Notes: Estimtes of Equation (16) using the compustat sample of non-financial firms with an S&P rating BB+ or worse including quarters 2013Q1 to 2018Q4. Left panel illustrates how capital expenditure of bond-intensive firms first drops after the original Maringlete verdict and then recovers relative to other firms after its overturning; estimates $\hat{\beta}(q)$ are shown relative to $\hat{\beta}(2014Q4)$. Right panel plots average investment rates—net of firm-fixed effects—for bond-intensive firms in green and other firms in blue. Whiskers mark 95% CI based on standard errors clustered at the firm level.
Figure A.13: Marlblegate’s effect on bond issuance rates beyond January 2017

Notes: Estimates from Equation (18) controlling for fixed effects using the compustat sample of non-financial firms with an S&P rating BB+ or worse including quarters 2013Q1 to 2018Q4. Left panel illustrates how the probability of bond issuance drops for bond-intensive firms after the original Marlblegate verdict and then recovers relative to other firms after its overturning; estimates $\hat{\beta}(q)$ are shown relative to $\hat{\beta}(2014Q4)$. Right panel plots average issuance rates—net of firm-fixed effects—for bond-intensive firms in green and other firms in blue. Whiskers mark 95% CI based on standard errors clustered at the firm level.