Non-Financial Liabilities and Effective Corporate Restructuring*

Bo Becker† Jens Josephson‡ Hongyi Xu§

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Abstract

Many insolvency systems focus on restructuring financial liabilities, and ignore operational liabilities such as leases and long-term supplier contracts. We model the U.S. option to reject such contracts and find that it avoids excessive liquidation of firms with significant non-financial obligations and increases debt capacity ex ante. Using text analysis and accounting data to measure the extent of executory contracts, we test the debt capacity hypothesis using difference-in-difference tests comparing the U.S. to countries where rejection is limited and the introduction of rejection in Israel in 2019. We find operating restructuring is a key aspect of insolvency with a large impact on corporate capital structures.

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†Stockholm School of Economics, CEPR, & ECGI. Email: bo.becker@hhs.se

‡Stockholm University & IFN.

§Stockholm School of Economics.

1. Introduction

Despite the importance of managing insolvency and distress, for both credit markets and to economic outcomes, the legal system in this area varies in fundamental and important ways between countries – Djankov, Hart, McLiesh and Shleifer (2008) report that creditors' recovery in insolvency procedures vary by an order of magnitude between different countries.[1] These large differences in outcomes may reflect a range of factors. We propose that non-financial obligations pose an important challenge which many systems cannot handle. Fundamentally, this emphasis on non-financial (alongside financial) contracts is a natural implication of the Jensen and Meckling (1976) nexus-of-contracts view of the firm.

Our starting point is that non-financial obligations can impede the continued operation of a viable business. Just like financial contracts may not be possible to renegotiate outside of a formalized process (due to hold-up and free-riding problems), handling large non-financial claims in distress may require a formal procedure (Casey 2020 and Antill and Grenadier 2019). Non-financial claims are often large. In one sample of large Chapter 11 cases, lease obligations constitute twenty-three percent of liabilities and 70 percent of liabilities at the 90^{th} percentile (Ayotte 2015), suggesting that this can be a first-order question for many insolvent firms.

In Chapter 11 of the U.S. Bankruptcy Code, a few categories of claims – financial claims, collective bargaining agreements and a few other – are subject to special rules. But for all other contracts, a key mechanism for managing obligations is the rejection of executory contracts. An executory contract is one where both parties have remaining obligations (i.e., one-off transactions do not create executory contracts). Examples of executory contracts are office leases, where the landlord will supply an office and the tenant lease payments, long-term vendor contracts (Moon and Phillips 2020), and licensing agreements. Under Section 365 of Chapter 11, executory contracts can be *rejected* (abandoned), *assumed* (retained), or *assigned* (transferred to a third party). The rejection option gives firms considerable ability to reduce their future obligations. Examples of bankruptcy cases where this was important include Kmart and Hertz. For Kmart, the number of leases was large and the company sold rejection rights to a third party in order to reach decisions quickly (Gilson and Abbott 2009). Hertz, which at the

[1] Note that restructuring is typically separate from bankruptcy outside of the U.S. When we refer to 'insolvency law', we think primarily of any processes that does not liquidate: U.S. Chapter 11 bankruptcy, the UK Scheme of Arrangement, or the various national processes covered by the EU Insolvency Directive.

time of its Chapter 11 process leased almost half a million vehicles under a "master lease agreement", rejected some leases and retained others, adopting the fleet to lower rental car demand post-Covid. These two cases highlight the important option values embedded in the right to reject a range of contracts.[2]

Outside of the U.S., it remains rare for restructuring law to explicitly involve operational claims the way Chapter 11 does, and especially rare to give such unconstrained rights to the debtor company to reject contracts.[3] We develop a model of an insolvent firm with financial and operational obligations, and study how capital structure and insolvency choices depend on whether debtors may reject executory contracts. We characterize outcomes under a restructuring process which allows adjusting both types of obligations (Chapter 11) and one limited to financial claims (most other processes), and also consider a setting without restructuring possibilities.[4,5]

When both operational and financial claims are addressed simultaneously, it becomes more likely that firm liabilities can be sufficiently reduced for the businesses to survive. In the model, the option to reject executory contracts strengthens the bankrupt firm's bargaining power vis-à-vis the contract counterparties. This allows the firm to renegotiate its contract terms and reduce the operating liabilities, alongside financial debts. Putting all liabilities on the table raises the likelihood of successful restructuring.

The model connects rejection of executory contracts to capital structure and restructuring outcomes. Ayotte (2015) points to the importance of executory contracts for Chapter 11 (we are not aware of any quantitative evidence outside of the U.S.). In assessing the empirical relevance of our model, we focus on the prediction that executory contracts that cannot be rejected should discourage financial leverage. We test this by

[2]Aircraft leases have a different position from typical executory contracts. Under section 1110 of the bankruptcy code, a debtor has 60 days to cure such leases, i.e. the automatic stay ends at that point (prior to the 2005 BAPCPA reform, the debtor had more time). This presumably makes rejection less effective for aircraft leases. See Benmelech and Bergman (2011) for a discussion on the financial implications of insolvency for airlines.

[3]For example, in an overview of thirty jurisdictions in Chuah and Vaccari, eds (2023), only the U.S. provides a broad and unconditional right to reject, with some rejection options in Australia, Greece and Italy. In other countries, rejection is allowed if it does not cause harm to counterparties, or only when the debtor is liquidated, or not at all. We discuss the international legal differences below.

[4]We ignore other differences between systems, such as the treatment of secured debt (Vig 2013), the ability to cram down a plan of reorganization (Richter and Thery 2020), and the status of various types of collateral (Davydenko and Franks 2008).

[5]A non-U.S. company may file for Chapter 11 in the U.S. provided it "reside or [have] a domicile, a place of business, or property in the United States." However, this is expensive, and the number of such filings is very small compared to filings by U.S. companies (59 foreign enterprise filings compared to more than 60,000 filings by U.S. enterprises over the period 2012-2022).

sorting industries based on the amount of executory contracts that are typical for U.S. firms in the industry. For this we used detailed data on leases and rents reported under U.S. GAAP rules, and we also collect data on purchase obligations from 10-K filings, following Moon and Phillips (2020). There is significant variation across industries in the extent of executory contracts - for example, retail and hospitality tend to have important non-financial obligations such as leases, whereas mining oil and gas, and manufacturing industries tend to have limited.

We test whether the option to reject encourages leverage by comparing industries with high and low executory contract use in three separate settings. First, we compare the U.S. (where rejection is relatively easy) to everywhere else (where it is impossible, cumbersome, or limited). Second, we compare Israeli firms before to after a new Company Law introduced in 2019, which allowed rejection of contracts. In both cases, controlling for time and firm fixed (and implicitly, country) effects, we find large and statistically significant positive effects on leverage. In cross-country tests, we estimate that a change in the ratio of executory contracts from the 25^{th} to the 75^{th} percentile (around 4 percent of annual revenues) corresponds to an increase of leverage in the U.S. of 0.02 (average leverage is 0.231), or around 10% higher debt. The Israeli before- and after tests produce similar magnitude estimates. Third, we also test the model's prediction in lending data from Dealscan, i.e. in loan flow data. High executory contract industries are associated with higher credit volumes in the U.S., consistent with an effect of operational restructuring rules on the debt capacity (higher) and capital structure choices (more debt) of firms.[6]

Our evidence, taken together, suggests that executory contracts matter for financial leverage – the financial debt capacity of firms in industries that rely on executory contracts is significantly affected by a rejection option. This evidence is consistent with our model, which highlights how rejection can avoid liquidation and improve debt capacity. Additionally, the Israeli example suggests that reform in the U.S. direction is possible in other countries, and can be effective outside of the particular institutional setting of Chapter 11.[7]

The rest of this paper is structured as follows. In Section 2, we discuss related literature. In Section 3, we introduce the theoretical framework and present our theoretical

[6]The number of loans issued in Israel is too small for applying the loan flow methodology to Israeli data.

[7]We have not investigated the implications for contracts of the rejection option, mostly because we expect these to be difficult to investigate empirically. In an earlier version of the model, we endogenized contracts, and predicted that executory contracts would entail higher contracted pricing when rejection is possible.

results. In Section 4, we describe the empirical method and present our empirical results, and in Section 5, we conclude. Proofs and derivations of theoretical results can be found in the Appendix, together with a list of variables, an overview of the legal treatment of executory contracts internationally, and a description of the data collection procedure for the text analysis.

2. Related literature

The system for handling insolvent and distressed firms is critical to a range of economic and financial outcomes.[8] A key requirement for a successful system is avoiding liquidation of viable firms, and this sometimes necessitates restructuring of liabilities, including non-financial obligations such as those stemming from executory contracts. Eisfeldt and Rampini (2009) argue that financially constrained firms lease capital, whereas unconstrained firms own their capital. This underlines the importance of handling leases in insolvency.

Many contracts are long-term (e.g. Giglio et al. 2014), and will be executory for a large part of their life (i.e., both parties have important remaining obligations). The treatment of executory contracts in U.S. bankruptcy is controlled by Section 365 of the bankruptcy code.[9] Each executory contract is either rejected or assumed – assumed contracts become an obligation of the debtor, while rejected contracts become general unsecured claims (i.e. a relatively junior claim) of the debtor (assumption requires curing any defaults).[10] Fried (1996) points out that the ability to reject contracts without fully compensating the injured party may be *too strong*, to the point where socially valuable contracts may be rejected (*e.g.*, if a lot of the value has been delivered whereas more of the payments remain). This does not occur in our model, since the executory contract is renegotiated rather than rejected in equilibrium.

[8] For example, the use of secured and asset-based debt (Vig 2013 and Lian and Ma 2020), bank lending to 'zombie' firms (Becker and Ivashina 2022 and Jorda et al. 2022), high yield bond markets (Becker and Josephson 2016), and the efficiency of business liquidation decisions (Bris et al. 2006).

[9] Ayotte (2015) examines important reforms of this section in 2005, including a reduction in the time available to make assumption-rejection decisions.

[10] Countryman (1972) and Countryman (1973) discuss the evolution of the treatment of executory contracts under U.S. bankruptcy code (before the modern Chapter 11). Countryman (1972) defines an executory contract as follows: "...within the meaning of the Bankruptcy Act an executory contract is one under which the obligations of both the bankrupt and the other party to the contract are so far unperformed that the failure of either to complete performance would constitute a material breach excusing the performance of the other" which agrees with current rules.

Executory contracts are important to U.S. bankruptcy practice. Using hand-collected data on firms that filed for Chapter 11 during the period 1991 to 2004, Lemmon, Ma and Tashjian (2009) show that the leases are rejected extensively in Chapter 11 and that the disposition of lease commitments rivals asset sales as a means of asset reduction in bankruptcy. Ayotte (2015) shows that lease obligations are large in the typical listed company Chapter 11 case, and very large in some cases. Ma and Tashjian (2015) establish that the value of operating leases raise the likelihood that a firm will file for Chapter 11 (rather than restructure out of court), in line with the usefulness of Section 365.

Outside of the U.S., rejection of executory contracts is more difficult. Dávalos (2017) compares the US, German, and Spanish systems and finds that the Spanish system give less incentives to reject value-creating contracts because claims from rejected executory contracts are very senior (treated as administrative expenses). Israel is an important example (Hahn and Kimhi 2021). A new Company Law, in effect since 2019, codified a flexible treatment of executory contracts of restructuring firms. The law gives a debtor 90 days from the start of proceedings to file a motion to reject a contract, and rejection is allowed with very few conditions. Counterparties of rejected contracts have an unsecured claim on the estate. In other words, this is now very similar to the U.S. situation. Based on Chuah and Vaccari, eds (2023), we classify thirty countries in terms of treatment of executory contracts, and conclude that three other countries (Australia, Greece and Italy), at least on paper, appear to offer insolvent firms options – we estimate results with these countries grouped together with the U.S. Ayotte and Yun (2007) point out that the optimal bankruptcy law depends on the capabilities of the legal system. Our assessment is that the option to reject executory contracts is relatively straightforward, and could be implemented in most OECD countries, and this is the assumption behind our cross-sectional tests. However, this conjecture is difficult to verify. It is possible that a reform such as that undertaken in Israel has prerequisites in terms of judge skill sets and legal environment, in order to be effective.

3. Theoretical analysis

3.1 Framework

We develop a two-period model of a distressed firm with financial debts and non-financial obligations. A firm has an executory contract with a supplier for the delivery of

a quantity β of an input at a unit price of p in period 2.[11] The supplier's opportunity cost of the input is given by $k < p$, which represents what the supplier gives up in order to supply the input. This opportunity cost can be thought of as the market value in some secondary use.[12]

In period 1, the firm invests in a project. The investment is partly financed with debt and partly with equity. The expected value of debt is d and the expected value of equity is e. Both are determined endogenously within the model. We assume a competitive capital market made up of a continuum of identical risk-neutral creditors and a risk-free rate normalized to zero.

Between period 1 and period 2, the realization s of a random variable $S \sim Uni\,[0,1]$, determining the firm's revenues, is revealed to all parties.[13]

In period 2, the firm has revenues of $\alpha s + \beta q$, where αs are the revenues without the input and $q \in (k,p)$ is a measure of the productivity of the input. In the same period, the contracted payment of the input βp, and gross debt – i.e. the face value of debt plus the corresponding interest rate – denoted D, are due. If profits are positive, they are taxed at a rate $t > 0$.

If the revenues are not enough to cover expenses in period 2, i.e. if $\alpha s + \beta q < D + \beta p$, the firm will enter bankruptcy and be liquidated or restructured. We assume executory claims have priority over revenues in bankruptcy, but that the corresponding unsecured claims are paid zero in case of rejection. We also assume there is a cost $C > 0$ of bankruptcy and that a liquidation implies a net cash flow of $L - C > 0$.

We will study three institutional settings.

N. In the *No restructuring* setting, no restructuring is possible, and insolvent firms (low realization of S) are liquidated. This corresponds to a traditional bankruptcy process where all assets are sold and all contracts terminated.

F. In the *Financial restructuring* setting, a financial restructuring is available as an alternative to a liquidation. This means that the debts of an insolvent firm can be

[11] In a previous version of the model, we allowed this price to be determined endogeneously. This complicated the model considerably without altering the main qualitative conclusions.

[12] As described in the introduction, an executory contract is one where both parties have remaining obligations. In other words, the initial contracts was long-term and involved ongoing obligations for both parties. Such contracts may be optimal when spot markets are insufficient, for example reflecting asymmetric information before the contract is signed (Fudenberg et al. 1990), if the parties feature bounded rationality (Bolton and Faure-Grimaud 2010) or to reduce renegotiation costs (Klein et al. 1978 and Halonen-Akatwijuka and Hart 2020).

[13] The assumption of a uniform distribution makes it possible to derive explicit solutions, but one can show that most of the results in the paper hold also for a general class of distributions with increasing hazard rate.

written down and corresponds fairly well to typical European Union restructuring procedures.

O. In the *Operational and financial restructuring* setting, an operational and financial restructuring is available as an alternative to a liquidation. We model operational restructuring through the right to reject executory claims. This corresponds most clearly to Chapter 11 of the U.S. Bankruptcy Code.

In our model, the bankruptcy cost C is what gives the firm incentives to restrict leverage. In order to rule out corner solutions, we will assume this cost is neither too large nor too small:

$$C < t(\alpha - \beta(p-q) - L), \tag{A1}$$

$$\beta(p-k) < C. \tag{A2}$$

Assumption A1 guarantees that there will be a range of outcomes such that the bankruptcy court prefers to perform a financial restructuring rather than to liquidate the insolvent firm. Assumption A2 guarantees a range of outcomes where the firm is solvent and also implies shareholders will not receive any payout in a bankruptcy.

We continue by deriving the equilibrium in each of the three institutional settings and thereafter compare the equilibrium outcomes.

3.2 No restructuring

We first analyze the most basic institutional setting, where no restructuring is possible. In this setting, an insolvent firm – i.e. with low realization of S – is liquidated.

Threshold

Solvency, meaning the ability to repay debts, is a key attribute of a firm in the model, and it depends on the realization s of S. The firm is solvent if and only if

$$\alpha s - \beta\left(p-q\right) - D \geq 0, \tag{1}$$

i.e. for s above s_I, defined as:

$$s_I := \left(D + \beta\left(p-q\right)\right)/\alpha. \tag{2}$$

In this setting, with only a liquidating process for insolvent firms, the firm is liquidated for realizations of S below s_I.

Equilibrium

In equilibrium, the firm chooses gross debt to maximize the expected value of the firm subject to the constraint that creditors break even in expectation when the insolvency threshold is given by s_I (which is a function of D).

In period 1, the expected values of equity and debt (henceforth, we will refer to the latter as *net debt*) given D can be formulated as:

$$e = (1-t)\int_{s_I}^{1}(\alpha s - \beta(p-q) - D)\,ds, \tag{3}$$

$$d = (L-C)\int_{0}^{s_I} ds + D\int_{s_I}^{1} ds. \tag{4}$$

Differentiating the concave firm value, $f = d + e$, with respect to gross debt, D, gives the interior first-order condition (a corner solution with $D = 0$ is ruled out by Assumption A1):

$$t(\alpha - D - \beta(p-q))/\alpha + (L - C - D)/\alpha = 0. \tag{5}$$

Denoting equilibrium values of variables in setting $i \in \{N, F, O\}$ by superscript i, we have that:

$$D^N = \frac{t(\alpha - \beta(p-q)) + L - C}{1+t}. \tag{6}$$

Substituting in the insolvency threshold gives:

$$s_I^N = \frac{t\alpha + \beta(p-q) + L - C}{\alpha(1+t)}, \tag{7}$$

and the values of equity and net debt (see the Appendix for calculations):

$$e^N = \frac{(1-t)(\alpha - \beta(p-q) - L + C)^2}{2\alpha(1+t)^2}, \tag{8}$$

$$d^N = \frac{t(L - C - \alpha + \beta(p-q))}{1+t}\frac{t\alpha + \beta(p-q) + L - C}{\alpha(1+t)} + \frac{t(\alpha - \beta(p-q)) + L - C}{1+t}. \tag{9}$$

3.3 Financial restructuring

Second, we analyze the institutional setting where the insolvent firm is restricted to either a financial restructuring or a liquidation. A financial restructuring is carried out through a write-down of debt of insolvent firms, while equity is eliminated. A write-down could be achieved *in court* or *out of court*. In the latter case, a bond trustee might coordinate and bargain on creditors' behalf.[14]

Thresholds

As in the setting with no restructuring, the firm is solvent if and only if the revenue realization is high: $s \geq s_I$ (where s_I depends on D as defined above). For realizations of S below this level, the firm value equals the value of debt. The value of debt is greater with ongoing operations than in a liquidation provided:

$$\alpha s - \beta (p - q) \geq L. \tag{10}$$

The bankruptcy court will thus write down debt for s below s_I and above:

$$s_L^F := (L + \beta (p - q)) / \alpha. \tag{11}$$

and liquidate the firm for s below this threshold. Assumption A1 implies that the liquidation threshold is strictly below the insolvency threshold. Hence, under this assumption there will be a range of signals resulting in a financial restructuring.

Equilibrium

In equilibrium, the firm chooses the level of gross debt that maximizes firm value, subject to the constraint that creditors break even in expectation when the insolvency and liquidation thresholds are given by s_I and s_L^F, respectively.

[14] An example of this is Norway, where a bond trustee typically has contractual rights to make payment changes on behalf of investors. This type of contract is not possible in the U.S., but out-of-court solutions may be found in other ways (see Bolton and Scharfstein 1996).

The values of equity and net debt in period 1 given D can be expressed as follows:

$$e = (1-t)\int_{s_I}^{1}(\alpha s - \beta(p-q) - D)\,ds, \tag{12}$$

$$d = (L-C)\int_{0}^{s_L^F} ds + \int_{s_L^F}^{s_I}(\alpha s - \beta(p-q) - C)\,ds + D\int_{s_I}^{1} ds. \tag{13}$$

Differentiating the concave firm value, $f = d + e$, with respect to gross debt, D, gives the interior first-order condition (a corner solution with $D = 0$ can be ruled out by Assumption A1):

$$t(\alpha - D - \beta(p-q))/\alpha - C/\alpha = 0, \tag{14}$$

implying an optimal gross debt of:

$$D^F = \alpha - \beta(p-q) - C/t, \tag{15}$$

and an insolvency threshold of:

$$s_I^F = 1 - \frac{C}{t\alpha}. \tag{16}$$

Substituting the optimal gross debt D^F in the expressions for the values of equity and net debt gives (see the Appendix for derivations):

$$e^F = \frac{1-t}{2\alpha t^2}C^2, \tag{17}$$

$$d^F = \frac{(L+\beta(p-q))^2}{2\alpha} - C - \frac{C^2(1-2t)}{2\alpha t^2} + \frac{\alpha - 2\beta(p-q)}{2}. \tag{18}$$

3.4 Operational and financial and restructuring

In the third setting, the insolvent firm may write down debt as well as reject the executory contract and liquidate the firm. The option to reject the executory contract increases the firm's bargaining power relative the supplier. More precisely, we imagine that it enables the firm to make a take-it-or-leave-it offer of a new and lower unit price of the input to the supplier, which the latter will accept provided it is at least as good as the outside option. This bargaining interpretation is in line with e.g. Casey (2020), who argues that the fundamental attribute of Chapter 11 is to create a bargaining framework for renegotiation.[15]

[15]There are several reasons why a renegotiation of the executory contract may not be possible in a setting without the option to reject executory contracts. Given the assumption that the executory claimant has

Thresholds

Just like in the two settings above, the firm is solvent if and only if $s \geq s_I$ (which depends on D). For realizations of S below this threshold, the firm will use the rejection option to renegotiate its contract with the supplier, lowering the unit price for the input from p to k.

Creditors prefer to continue the operations of the firm with the renegotiated contract rather than to liquidate the firm if and only if:

$$\alpha s + \beta (q - k) - C \geq L - C. \tag{19}$$

This gives the liquidation threshold:

$$s_L^O := (L + \beta (k - q)) / \alpha \tag{20}$$

Assumption A1 implies that the liquidation threshold is below the equilibrium insolvency threshold and Assumption A2 that the latter is below one.

Equilibrium

In equilibrium, the firm chooses the level of gross debt that maximizes firm value, subject to the constraint that creditors break even in expectation when the insolvency and liquidation thresholds are given by s_I and s_L^O, respectively.

In period 1, the values of equity and net debt given D equal:

$$e = (1 - t) \int_{s_I}^{1} (\alpha s - \beta (p - q) - D)\, ds, \tag{21}$$

$$d = (L - C) \int_{0}^{s_L^O} ds + \int_{s_L^O}^{s_I} (\alpha s + \beta (q - k) - C)\, ds + D \int_{s_I}^{1} ds. \tag{22}$$

The firm value in the same period, $f = d + e$, is a concave function of gross debt, D. Differentiating the firm value with respect to this variable gives the interior first-order

priority over financial claimants in bankruptcy, it has no incentive to renegotiate as long as debt write-downs prevent a liquidation. If revenues are so low that the firm would be liquidated without a renegotiation, funds may not be sufficient to pay the supplier what it could earn elsewhere. Finally, although we describe the executory claimant as a single entity, an alternative interpretation is that are many small executory claimants that may have difficulties coordinating a renegotiation.

condition (once again, a corner solution with $D = 0$ can be ruled out by Assumption A1):

$$(\beta(p-q)+\beta(q-k))/\alpha + t(\alpha - D - \beta(p-q))/\alpha - C/\alpha = 0, \tag{23}$$

implying an optimal gross debt of:

$$D^O = \alpha + \beta(q-p) - C/t + \beta(p-k)/t, \tag{24}$$

and the insolvency threshold:

$$s_I^O = 1 - \frac{C}{\alpha t} + \frac{\beta(p-k)}{\alpha t}. \tag{25}$$

Substituting in the expressions for equity and net debt gives (see the Appendix for derivations):

$$e^O = \frac{1-t}{2\alpha t^2}(C - \beta(p-k))^2, \tag{26}$$

$$d^O = \frac{(L-\beta(q-k))^2}{2\alpha} - (1-2t)\frac{(\alpha t + \beta(p-k) - C)^2}{2\alpha t^2} + \frac{(1-t)(\alpha t + \beta(p-k) - C)}{t} + \beta(q-p). \tag{27}$$

3.5 Comparing the institutional settings

We conclude the theoretical analysis by comparing the equilibrium outcomes in the three different institutional settings. We will start with the gross debt levels. It follows from Assumptions A1 that gross debt is smaller in setting N than in setting F and it follows trivially from the expressions that gross debt is higher in setting O than in setting F.

Proposition 1 *The following holds for gross debt in the three settings:*

$$D^N < D^F < D^O.$$

The intuition for the inequalities is that the trade-off between the marginal tax benefit from higher gross debt and the incremental cost in terms of a higher likelihood of bankruptcy differs in the three settings. In setting N, bankruptcy is relatively costly since it leads to an inefficient liquidation. In setting F, insolvency is less costly since the firm may continue operations. In setting O, the cost is further reduced since the executory contract can be rejected or renegotiated.

It is also straightforward to order the three liquidation thresholds (recall that the liquidation threshold equals the insolvency threshold in setting N). The left-most inequality is trivial and the right-most inequality follows from Assumption A1.

Proposition 2 *The liquidation thresholds in the three institutional settings satisfy:*

$$s_L^O < s_L^F < s_I^N.$$

The intuition for these inequalities is that more restructuring possibilities makes liquidation unattractive for a wider range of outcomes.

Gross debt determines the insolvency threshold, implying that the probability of insolvency can be ordered as follows in the three settings:

$$s_I^N < s_I^F < s_I^O.$$

Since shareholders are the residual claimants of any cash flow above the insolvency threshold, it follows that the value of equity in period 1 in the three setting have the reverse order.

$$e^O < e^F < e^N.$$

Continuing with the value of net debt, tedious calculations and Assumptions A1 and A2 give the following result.

Proposition 3 *Net debt in the three settings satisfy:*

$$d^N < d^F < d^O.$$

The last result follows on one hand from the ranking of gross debt in Proposition 1 and on the other hand that creditors are paid more for intermediate realizations of the signal when there are more restructuring possibilities.

We are interested in how the difference in net debt changes in response to changes in the quantity of the input, β. Differentiating the debt differences with respect to β gives us the following result due to Assumptions A1 and A2.

Proposition 4 *Net debt is increasing faster in the quantity of the input in setting O than in the other settings:*

$$\frac{\partial\left(d^O - d^F\right)}{\partial\beta} > 0, \frac{\partial\left(d^O - d^N\right)}{\partial\beta} > 0.$$

The option to reject executory contracts is more valuable to creditors the larger the executory contract.[16]

Using Assumption A1, it is straightforward to rank the firm values in the three settings.

Proposition 5 *Firm values in the three settings satisfy:*

$$f^N < f^F < f^O.$$

The possibility of operational restructuring is valuable since it avoids inefficient liquidation.

Finally, we consider the difference in total surplus between settings O and F, $W^O - W^F$. We will assume that a liquidation entails a negative externality given by Z. This could for instance represent the loss of firm-specific physical and human capital.[17] Setting O entails a smaller probability of liquidation, but a larger probability of incurring the bankruptcy cost, resulting in the following expression:

$$\begin{aligned} W^O - W^F &= \int_{s_L^O}^{s_L^F} (\alpha s + \beta (q-k) - L + Z)\, ds - C \int_{s_I^F}^{s_I^O} ds \\ &= \frac{\beta (p-k)}{\alpha} \left(\beta (p-k)/2 - C/t + Z\right). \end{aligned} \tag{28}$$

Operational restructuring is thus welfare improving if the gain from renegotiation and the negative externality from liquidation are large compared to the ratio of the bankruptcy cost to the tax rate.

4. Empirical evidence

Our model captures the idea that executory contracts can be important to the viability of an insolvent firm. The model is relevant when executory contracts are important. Ayotte (2015) documents that this is true in Chapter 11 cases, i.e. among distressed U.S. firms. We provide suggestive data from a large set of publicly traded firms.

The key prediction of our model is that, in industries with significant amounts of executory contracts, financial leverage should be low in a system without operating

[16] On the other hand, increasing β has an ambiguous effect on the difference in interest rates (defined as the ratio of gross to net debt) between the O and the F settings. It is positive for a wide range of parameter values, but becomes negative for a sufficiently high tax rate and a sufficiently small loss on the executory contract, $|q-p|$.

[17] For empirical estimates of bankruptcy externalities on physical capital see Bernstein et al. (2019) and on human capital see Graham et al. (2023).

restructuring, and higher in a system that allows operating restructuring (Proposition 4). We examine this empirically in an international cross-section of capital structure data. We use two empirical approaches. First, we consider Chapter 11 more capable of operating restructuring than other systems, and run cross-country capital structure regressions. Second, the 2019 new Company Law in Israel clearly established that contracts could be rejected without reason in restructuring procedures – we consider this an increase in the ability to restructure operating claims, and use this for difference-in-difference tests (assuming the change is more important to industries with wider reliance on executory contracts). [18]

The rest of this section presents data sources and empirical tests.

4.1 Data

We employ three main data sets to investigate the impact of operational restructuring rules in insolvency on credit markets. First, we use Compustat-CapitalIQ to understand how the intensity of executory contract use varies across industries, and to measure the capital structure of firms in various countries. Second, we use Refinitiv LoanConnector Dealscan to collect data on syndicated lending. Third, we use text analysis to extract information about Long-term Purchase Agreements from 10-K filings.

Firm level capital structure data comes from Compustat-CapitalIQ; we also use this data set to construct industry-level measures of the typical extent of executory contracts by industry. There are two firm samples: one for the U.S. (Compustat), and one for the rest of the world (CapitalIQ). Accounting variables in these data sets are reported in local currency, and we use average annual exchange rates from the European Central Bank (ECB) Statistical Warehouse to translate all amounts into U.S. dollars. We use Bureau of Labor Statistics price level data to translate data for earlier years into 2022 dollars.

We use two main sources of data on executory contracts by industry. In both cases, we use U.S. firm level data to calculate how important executory contracts typically are for firms in an industry, and assume that the relative importance of executory contracts in a U.S. industry is informative about the same industry for all the countries in our sample. Using industry-level variation reduces noise in measurement, and allows us to use detailed accounting data available for U.S. firms for tests on global samples. The first measure of executory contracts is accounting data which (under U.S. GAAP) cover

[18] The Data section below discusses the treatment of executory contracts in countries other than the U.S. and Israel.

leases and rental contracts. We use the variables "Debt Equivalent of Operating Leases", "Capital Leases" and "Net Rental Expenses". The two first items refer to the value of obligations, either capitalized in the balance sheet (capital leases) or capitalized for comparison purposes. Rent is an annual income statement item, and we multiply it by three to approximate typical contractual commitments (our results are qualitatively unchanged if we use two, four, or five instead).

The second component of executory contract use is based on text parsing of 10-K filings at SEC, following Moon and Phillips (2020). Since an SEC ruling in 2003, firms are required to include tables with purchase obligations in their 10-Ks, together with leases (which we ignore, taking their value from balance sheets). The detailed process for extracting the purchase obligation data is described in the Appendix.

Our main measure of executory contract use in each industry is the median across all firms in the industry of the sum of the executory contract liabilities (i.e., rent time three, leases and purchase obligations), normalized by assets. We use a single year (2018) to calculate industry averages. The coverage of firms and industries is better for more recent years, and we want to use data before the Covid-19 pandemic (which may have impacted leases and rents in unusual ways). The industry-level variables appear very stable over time (we have similar results using 2014 or 2016 data for leases and rents, and 2017 data for long-term contracts).

Average executory contracts for Fama-French 30 industries are reported in Table 1. In all our tests, we exclude Utilities (industry 20) as their capital structure is often regulated (results are similar if we include this). We also drop banks, based on sic codes between 6000 and 6199 (this is part of Banking, Insurance, Real Estate, Trading, industry number 29). Results are similar with alternative definitions using 12 or 44 industries instead of 30. The industries with the highest amount of obligations under executory contracts are Retail (27), Apparel (7) and Aircraft, ships and railroad equipment (16). Retail has a lot of rent and lease payments, Aircraft has large amounts of long-term purchase agreements, and apparel has both. U.S. Chapter 11 procedures where rejections play a large role in the industries include Kmart (industry 27), Payless ShoeSource (also 27). After these industries, Restaurants, Hotels and Motels (28), Communication (21); and Tobacco products have relatively high values through different combinations of rent, leases, and long-term agreements. In contrast, industries Textiles (10); Precious Metals and Mining (17) and Petroleum and Natural Gas (19) have low use of executory contracts (i.e. low values for all components). Our assumption is that industries vary systematically in the

amount of executory contracts they tend to have, and that U.S. firms are representative (detailed data is available for U.S. firms). This appears reasonable given the nature of industries at the top and bottom of Table 1. In the firm panel sample used in regressions, the 25^{th} and 75^{th} percentiles of executory contracts normalized by assets are 0.050 and 0.099, and the interquartile range is 0.05. The table also reports executory contracts normalized by revenues, which has similar magnitudes – we use the asset-based measure for our main tests .

Table 1: **Value of executory contracts by industry**

Fama-French 30 Industry	**Executory contracts over assets**	**Purchase obligations share of exec. contracts**
Retail	0.421	20%
Apparel	0.225	65%
Aircraft, ships, and railroad equipment	0.199	91%
Restaurants, Hotels, Motels	0.169	29%
Utilities (*excluded from tests*)	0.151	93%
Communication	0.151	36%
Tobacco Products	0.141	77%
Wholesale	0.124	67%
Beer & Liquor	0.104	74%
Personal and Business Services	0.099	25%
Consumer Goods	0.096	68%
Chemicals	0.094	86%
Transportation	0.092	51%
Business Equipment	0.089	69%
Printing and Publishing	0.088	39%
Food Products	0.086	77%
Recreation	0.082	45%
Healthcare, Medical Eq., Pharmaceuticals	0.082	45%
Construction and Construction Materials	0.076	75%
Steel Works Etc	0.073	88%
Business Supplies and Shipping Containers	0.069	71%
Everything Else	0.064	78%
Fabricated Products and Machinery	0.050	65%
Automobiles and Trucks	0.049	69%
Coal	0.047	55%
Electrical Equipment	0.047	60%
Petroleum and Natural Gas	0.040	71%
Metals and Mining	0.024	65%
Textiles	0.016	51%
Finance and Real Estate (*partially excluded from tests*)	0.006	84%

To test the impact of executory contract rules, we employ data on global firm capital structures using a global sample from Compustat-CapitalIQ. We use accounting data (e.g., leverage, profitability, revenues) as well as information about industry, country and year. The global database contains less detail than for U.S. firms (e.g., regarding lease obligations), so we rely on industry-level variation calculated from U.S. data. We define leverage as the ratio of the sum of short-term debt and long-term debt to assets (we drop observations where this is outside the [0,1] range, and debt-to-EBITDA as the ratio of the long- and short-term debt to EBITDA (we drop observations where this is outside the [0,15] range). Summary statistics for leverage and debt-to-EBITDA for 2022 is presented in Table 2.

Table 2: **Summary Statistics dependent variables**

	10th Perc.	Mean	90th Perc.	Std. Dev.	Obs
Leverage					
Israel	0.01	0.273	0.603	0.232	550
U.S.	0.01	0.287	0.616	0.237	4,187
Rest of World	0.00	0.207	0.467	0.184	26,989
Debt/EBITDA					
Israel	0.29	4.068	8.980	3.484	334
U.S.	0.27	3.294	7.385	2.947	2,068
Rest of World	0.08	2.883	7.299	3.091	19,753

Summary statistics for various subsamples. Data are for the last year of the firm sample (2022) and excludes utrilities and banks.

In order to capture a flow measure of credit supply, we collect Dealscan data on syndicated loans. We start from all term loans made between 2010 and 2023. Revolving credit facilities are excluded since amounts mean something different in that loan category. We focus on new origination (however, changing the methodology to include changes in loan amounts that follow amendments does not impact our findings). Finally, we exclude subordinated loans, a small minority (including subordinated loans does not change our results). This leaves 492,973 loans. We aggregate amounts by Fama-French industry, year, and country. There are 10,033 cells with non-zero volumes out of a potential total of around 70 thousand (14 years, 30 industries, 169 countries). For robustness tests, we focus on OECD countries only, which produces a sample of 4,768 observations

out of a potential total of around 12 thousand.[19] We examine both total amounts of term loans and the number of loans made, and calculate several control variables as straight averages of loans in a cell - the fraction loans with a sponsor, the fraction of loans with working capital as the stated purpose, and the fraction of loans with deal purpose ("Merger", "Takeover", "Acquisition" or "Leveraged Buyout").

International variation in the treatment of Executory Contracts

The U.S. Chapter 11 treatment of executory contracts unique. In an overview of the treatment of executory contracts in distress, Chuah and Vaccari, eds (2023) collects detailed country-level assessments of the status of this for thirty different countries. Based on Chuah and Vaccari, eds (2023), we provide a simplified classification of the treatment of executory contracts in insolvency procedures as follows. We consider a regime comparable to the U.S. system if (a) there is an in-court procedure for insolvent or distressed firms which does not automatically liquidate; (b) in this procedure, debtors (or their representatives) can reject or assume executory contracts freely (e.g., without fairness tests and not subject to counterparty approval); (c) Ipso Facto contract terms are not enforced (these terms can give counterparties the right to walk away from executory contracts); and (d) counterparties do not have rights to withhold performance on executory contracts with insolvent firms. When rules have changed, we focus on 2021 (i.e. we include data on recent reforms even if these are not relevant for the whole sample). This incorporates some recent reforms, and may therefore slightly overstate the rejection options available during our sample period. When rules differ for different types of executory contracts, we focus on leases.

Table 6 in the Appendix presents our assessment for the thirty countries covered by Chuah and Vaccari, eds (2023). According to our classification, apart from the U.S., only Australia, Greece and Italy feature a right to reject and assume contracts. We cannot verify that this corresponds to actual practice (e.g., whether there are any examples of restructuring procedures for large firm where important contracts were rejected), and we have not managed to identify how long-standing current practices are (i.e., would the current classification apply to our whole sample period). We have re-estimated tests (cf. table 3) where we group the three additional countries together with the U.S. (and exclude all firms from countries not covered by 6). Results are similar in magnitude and

[19] We have also tried including all the cells without loans, by considering the log of a constant (e.g., one) plus the number or value of loans. Results are very similar.

statistical significance but all the identification comes from the U.S.. Because we cannot verify the practical relevance of the rejection option in Australia, Italy and Greece, we only report results with firms from these three countries in the untreated group.

4.2 Empirical tests - Cross-country variation in leverage

In this section, we report tests of the impact of restructuring law on corporate capital structures using the developed and extensive U.S. Chapter 11 machinery for handling non-financial obligations. In particular, we compare leverage in industries where executory contracts tend to create extensive obligations, under the hypothesis that this reduces debt capacity by a little in the U.S. system but by a lot in jurisdictions offering less room for rejection. We consider all other countries the benchmark against which we compare U.S. firms. It is not entirely accurate that no other countries allow restructuring of executory contracts (see next section for an example), but it is generally true. When rejection is possible, it is typically restricted (Dávalos 2017). Our empirical hypothesis is therefore that firms in industries with high executory contracts, leverage should be higher in the U.S. than elsewhere. We have a treatment which happens in just a single year, so standard two way fixed effects (TWFE) regressions should work well (Roth et al. 2023). The regression equation is:

$$d_{it} = \theta X_{it} + \gamma E_j I_c^{treated} + \lambda G_{j\times t} + \eta H_{c\times t} + \epsilon_{it} \tag{29}$$

where d is either book leverage or debt over EBITDA, i is firm and t year, $j(i)$ the industry of firm i, $c(i)$ the country of firm i, X vector of firm controls, E executory contract intensity of industry j, $I_c^{treated}$ US, and where G and H are industry-year, and country-year dummies (i.e., we saturate for the dimensions $j \times t$ and $c \times t$, and identify off the $j \times c$ dimension). We cluster standard errors both by firm and country.

Table 3 reports results for leverage regressions comparing U.S. firms to those in other countries, either the full sample or the sub-sample of firms in OECD countries, using the executory contracts measures normalized by assets and revenue, respectively. All coefficients are positive and significant, suggesting that U.S. firms in industries which tend to use executory contracts more, have higher leverage (compared to industries with less such use, and compared to other countries). The coefficients suggest small but potentially important effect; for example, the first coefficient (0.199) implies that a change in the ratio of executory contracts to revenue from the 25$^{\text{th}}$ to the 75$^{\text{th}}$ percentile (around 0.05) corresponds to an increase of leverage in the U.S. of 0.01 (vs. average

Table 3: **Leverage of U.S. firms compared to those in other countries**

	All Countries		OECD	
	(1)	(2)	(3)	(4)
	Leverage	Debt/EBITDA	Leverage	Debt/EBITDA
Dependent var. mean	0.229	2.836	0.233	2.836
Executory contr. / Assets	**0.199*****	**3.422*****	**0.179*****	**3.486*****
	(0.038)	(0.576)	(0.055)	(0.716)
Observations	655,854	537,497	340,805	277,107

Regressions of book leverage or debt on control variables (dependent variable indicated at the top of each column). Each column refers to one regression. Observations are firm-years. Executory contracts refers to the interaction of an indicator for U.S. firms and the amount of executory contracts, normalized by assets or revenues. All regressions include controls and fixed effects. Standard errors clustered by firm and by industry-year are reported in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

leverage is 0.23), or around 5% more debt. The Debt-to-EBITDA coefficient in the second column (3.422) implies that moving from the the 25th to the 75th percentile corresponds to an increase of 0.19, or about 10% of the sample average, i.e. a 10% increase in the amount of debt.

These results suggest that operational obligations incurred through executory contracts reduce debt capacity outside the U.S., as predicted by our model. A potential concern with these results is that the U.S. context might differ in how debt and executory contracts are related due to reasons separate from insolvency law. In the next section, we examine a reform in Israel which allows us to test our hypothesis within a fixed jurisdiction.

4.3 Empirical Tests - leverage changes after Israel's Company Law reform in 2019

Until recently, the treatment of executory contracts during legal restructuring in Israel offered limited options. Prior to 2013, rejection was difficult, and after a 2013 legal case appeared possible under certain conditions. This right to rejection subject to different interpretations by different courts, and case law has diverged. In some cases, courts

disallowed rejection.

A new Company Law, in effect since 2019, codified and expanded the flexible treatment of executory contracts of restructuring firms. Now, a debtor has 90 days from the start of proceedings to file a motion to reject a contract, and rejection is allowed with few conditions (Hahn and Kimhi 2021). Counterparties of rejected contracts have an unsecured claim on the estate. The World Bank describes the reform as follows: "Israel made resolving insolvency easier through an amendment to its company law allowing the assumption or rejection of executory contracts, granting maximum priority to postcommencement credit, extending the maximum period of moratorium during restructuring proceedings and allowing the sale of secured assets when necessary to ensure a successful restructuring"[20]. In effect, the right to reject executory contracts appears similar to the U.S.

In our empirical tests, we focus on the increased ability to deal with executory contracts starting with the reform to the Company Law, in effect from 2019. We predict that financial leverage will increase following the reform for firms which operate in industries where executory contracts are important. By exploiting the different role of executory contracts across industries, and testing whether leverage increased *more* after the reform in those industries where executory contracts are important (than in industries where they are not), we can include time and industry fixed effects. Therefore, results are independent of aggregate time trends as well as of any industry-specific (but time-independent) determinants of leverage. In essence, the tests have a similar difference-in-difference interpretation as the cross-country but compare Israeli firms before and after the reform instead of U.S. firms to non-U.S. firms. The regression equation is:

$$d_{it} = \theta X_{it} + \gamma E_j I_{ct}^{treated} + \mu F_i + \lambda G_{j\times t} + \eta H_{c\times t} + \epsilon_{it} \tag{30}$$

where d is book leverage or debt-to-EBITDA, i is firm and t year, $c(i)$ represents the country of firm i, X vector of firm controls, E executory contract intensity of industry j, $j(i)$ industry, $I_{ct}^{treated}$ indicates observations in Israel in 2019 and later, and where F, G, H are firm, industry-year, and country-year dummies (i.e., we saturate for the dimensions $j \times t$ and $c \times t$, and identify off the $j \times t \times c$ dimension). We cluster standard errors both by firm and country. Comparing to the cross-sectional tests above, we can include firm fixed effects (they raise R-squared above 90% in all regressions, but their inclusion makes

[20] From https://archive.doingbusiness.org/en/reforms/overview/economy/israel, accessed June 2022.

little difference to the coefficient estimates of interest).

Table 4: **Leverage of Israeli firms around the 2019 Company Law Reform**

	(1)	(2)
	Leverage	Debt/EBITDA
Executory contracts / Assets	**0.632*****	**2.471*****
	(0.105)	(0.495)
Observations	606,173	542,197

Regressions of book leverage or debt on control variables (dependent variable indicated at the top of each column). Each coefficient refers to one regression. Observations are firm-years. Executory Contracts refers to the interaction of an indicator for Israeli firms after 2019 and the industry measure of executory contracts. All regressions include controls and fixed effects. Standard errors clustered by firm and by industry-year are reported in parentheses.

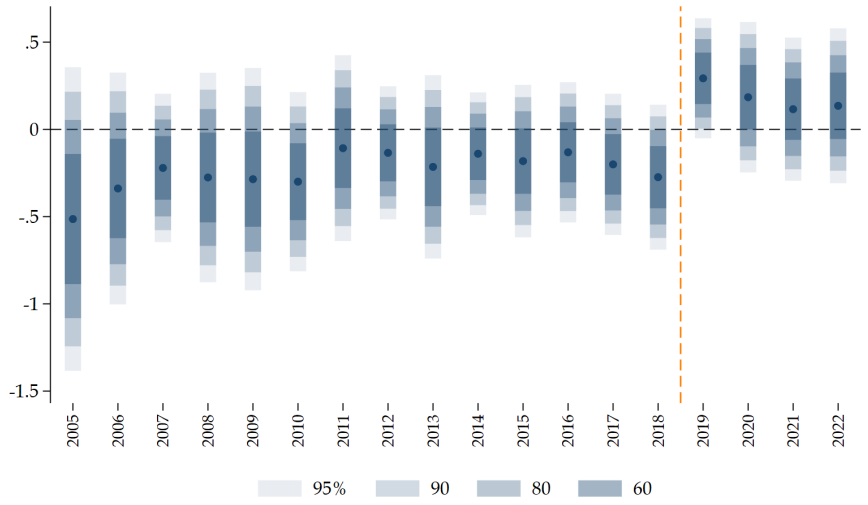
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of the two regressions are reported in Table 4. Coefficients are larger than the magnitude to the U.S. tests in Table 3 for leverage, and smaller for debt-to-EBITDA. The coefficients are highly statistically significant. The coefficients imply that high executory contract industries have leverage that is higher by 3-4 percent after the reform of insolvency law to permit executory contract rejection.

These difference-in-difference estimates compare the period 2000-2018 to the period 2019-2021. One potential identification challenge is that they require parallel trends – otherwise the estimates may reflect long-term, slow-moving trends, rather than a change around the time of the new law. We estimate year-by-year coefficients to assess this concern. Figure 1 plots year-by-year coefficients on the executory contract variables from 2005 onwards. The average for the 2000-2018 corresponds to the pre-period in Table 4, and 2019-2021 to the post-period (the reported coefficient corresponds approximately to the difference between these two averages). Starting from a negative point estimate (Israeli firms in industries with lots of executory contracts have lower leverage), there is a jump in 2019, which continues in 2020-2021. The post-reform period is characterized by a reverse or at least disappearing difference in leverage between high and low executory contract industries in Israel.

The Israeli figure shows two things. First, the effect occurs relatively suddenly in the years following the reform. There is no apparent trend before 2019. Second, 2020 and

Figure 1: **Leverage effect of executory contract claims for Israeli firms**



This figure plots year-by-year coefficients of leverage on executory contracts by industry, normalized by assets, with controls as in Table 2 and errors clustered by firm and by industry-year. Confidence intervals are indicated. The key reform was implemented in 2019.

2021 (perhaps affected by Covid) are not very different from 2019. This suggests that 2019 was the important year. Taken together, regressions and graphs suggest that the Israeli Company Law reform allows the same interpretation as the U.S. tests: an option to reject executory contracts, by making operational restructuring more effective, allows higher leverage. Presumably it also allows more successful restructurings and better access to credit for a few industries.

4.4 Empirical Tests - Cross-country variation in lending volumes

Our final tests consider the flow of loans reported in the Dealscan data base. Although Dealscan contains a large number of loans, there is not enough data to use Dealscan flow data for the Israeli 2019 reform - for example, there are only thirteen term loans in 2018 and eighteen in 2019, and most industry-years have no loans. Therefore, we focus on the difference-in-difference comparison of high and low executory contract industries and the U.S. vs. everywhere else.

We aggregate lending by year and industry and country, and test whether the U.S. sees larger flows in the industries that have high use of executory contracts. Loan value

Table 5: **Lending volume by country and industry**

	(1)	(2)
	Loan value	Loan number
Dependent variable mean	7.845	2.858
Executory contracts / Assets	**5.202*****	**2.649*****
	(0.403)	(0.283)
Observations	8,308	8,318

Regressions of total term loan origination, easured by total value and number of loans (both in logs). The sample covers 2010-2023H2. Observations are industry-year-country. Each column refers to one regression. Executory Contracts refers to the interaction of an indicator for U.S. firms and the amount of executory contracts (normalized). All regressions include controls as well as fixed effects. Standard errors clustered by country are reported in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

(dollars) and number are summed by country-industry-year. The regression equations for aggregate data by country-industry-year are:

$$d_{ict} = \theta X_{ict} + \gamma E_j I_c^{treated} + \mu F_i + \lambda G_{j\times t} + \eta H_{c\times t} + \epsilon_{ict} \tag{31}$$

where d is the value or number of loans, j is industry, t year, and $c(i)$ country. X is a vector of control variables (the share of loans with sponsor, share used for working capital purposes, and share for transactions purposes), E executory contract intensity of industry j, $j(i)$ industry, $I_c^{treated}$ indicates observations for U.S. firms, and where G and H are industry-year, and country-year dummies (i.e., we saturate for the dimensions $j \times t$ and $c \times t$, and identify off the $j \times c$ dimension). Each observation represents between one and 2,966 loans (49 on average). We cluster standard errors by country.

Results are reported in Table 5, where each coefficient represents one regression. The coefficients are positive and highly statistically significantly different from zero. The magnitudes implied are large. For example, the first coefficient implies a 4 percent higher lending volume in a U.S. industry as we go from the industry with the 25$^{\text{th}}$ to the industry with the 75$^{\text{th}}$ percentile of executory contract use, compared to the same industry outside the U.S. We conclude that evidence from the flow of leveraged loans agrees with capital structure evidence on the U.S. credit markets being relatively more generous with credit to industries with high use of executory contracts. We interpret

this as meaning that executory contracts reduce debt capacity *less* in the U.S. than elsewhere (possibly not at all). The treatment of executory contracts in insolvency is not the only possible explanation for this pattern, but it is perhaps the only one that fits both the cross-country and time-series capital structure evidence and flow evidence from Dealscan. [21]

5. Conclusions

The system for managing insolvent firms is important to economic performance (Gilson 2012), even beyond affected firms themselves (Bernstein et al. 2019). A particular challenge is posed by the restructuring of insolvent but viable firms (Gertner and Scharfstein 1991), and many countries struggle to approach the successful U.S. system (Djankov et al. 2008, Vig 2013, and Becker and Josephson 2016). We propose that the handling of non-financial obligations – in particular those created by executory contracts such as leases and long-term supply contracts – is a key design variable in insolvency law.

We develop a model where we can allow or disallow operational restructuring through the rejection of executory contracts. The ability to restructure non-financial obligation – what is achieved through rejection of contracts in Chapter 11 – allows more firms to restructure (instead of liquidate) and increases ex-ante financial debt capacity. Since executory contracts are large (we estimate that their value often exceeds 30 percent of assets) and important in many U.S. Chapter 11 cases (Ayotte 2015), we expect this to matter practically to corporate restructuring and credit markets.

We test the model's predictions in international data of leverage and lending. We employ two separate difference-in-difference approaches, relying on the difference of U.S. with the rest of the world, and on the changes to rejection rights embedded in the 2019 reform to Israel's Company Law. We find consistent evidence suggesting that restructuring non-financial obligations increases debt capacity of firms. We would expect liquidation to be rarer (difficult to test holding everything else equal), increased investment in affected firms and industries (not tested here, but likely testable), and development of debt markets (suggested by our findings). We believe that non-financial restructuring could be a suitable target for policy efforts in jurisdictions that wish to avoid the liquidation of viable firms.

[21] In an earlier version of this paper, we included tests of loan pricing, but given that these are theoretically ambiguous, we decided to not report such tests.

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Appendix

A. Net debt and equity

Equity in setting N:

$$\begin{aligned} e^N &= (1-t)\int_{s_I^N}^{1}\left(\alpha s-\beta\left(p-q\right)-D^N\right)ds, \\ &= \frac{\left(1-t\right)\left(\alpha-\beta\left(p-q\right)-L+C\right)^2}{2\alpha\left(1+t\right)^2} \end{aligned}$$

Net debt in setting N:

$$\begin{aligned} d^N &= (L-C)\int_0^{s_I^N} ds + D^N\int_{s_I^N}^{1} ds \\ &= \left(L-C-D^N\right)s_I^N + D^N \\ &= \frac{t\left(L-C-\alpha+\beta\left(p-q\right)\right)}{1+t}\frac{t\alpha+\beta\left(p-q\right)+L-C}{\alpha\left(1+t\right)} + \frac{t\left(\alpha-\beta\left(p-q\right)\right)+L-C}{1+t} \end{aligned}$$

Equity in setting F:

$$\begin{aligned} e^F &= (1-t)\int_{s_I^F}^{1}\left(\alpha s+\beta\left(q-p\right)-D^F\right)ds \\ &= \frac{1-t}{2\alpha}\left[\left(\alpha s+\beta\left(q-p\right)-D^F\right)^2\right]_{s_I^F}^{1} \\ &= \frac{1-t}{2\alpha t^2}C^2. \end{aligned}$$

Net debt in setting F:

$$\begin{aligned} d^F &= (L-C)\int_0^{s_L^F} ds+\int_{s_L^F}^{s_I^F}\left(\alpha s+\beta\left(q-p\right)-C\right)ds+D^F\int_{s_I^F}^{1} ds \\ &= (L-C)\,s_L^F+\frac{1}{2\alpha}\left[\left(\alpha s+\beta\left(q-p\right)-C\right)^2\right]_{s_L^F}^{s_I^F}+D^F\left(1-s_I^F\right) \\ &= (L-C)\,\frac{L+C-2\beta\left(q-p\right)}{2\alpha}+\frac{\left(D^F-C\right)^2}{2\alpha}+D^F\frac{C}{t\alpha} \\ &= \frac{1}{2\alpha}\left(L^2-C^2-2\left(L-C\right)\beta\left(q-p\right)+\left(D^F\right)^2-2D^FC+C^2+2D^F\frac{C}{t}\right) \\ &= \frac{1}{2\alpha}\left(L^2-2\left(L-C\right)\beta\left(q-p\right)+\left(\alpha+\beta\left(q-p\right)-C/t\right)\left(\alpha+\beta\left(q-p\right)+C/t-2C\right)\right) \\ &= \frac{1}{2\alpha}\left(\left(L-\beta\left(q-p\right)\right)^2-C^2/t^2+2tC^2/t^2\right)-C+\frac{\alpha+2\beta\left(q-p\right)}{2} \\ &= \frac{\left(L+\beta\left(p-q\right)\right)^2}{2\alpha}-C-\frac{C^2\left(1-2t\right)}{2\alpha t^2}+\frac{\alpha+2\beta\left(q-p\right)}{2}. \end{aligned}$$

Equity in setting O:

$$e^O = \frac{1-t}{2\alpha t^2}\left(C-\beta\left(p-k\right)\right)^2.$$

Net debt in setting O:

$$\begin{aligned}
d^O &= L\frac{L-2\beta\left(q-k\right)}{2\alpha}+\frac{1}{2\alpha}\left(\left(\alpha s_I^O\right)^2+2\alpha s_I^O\beta\left(q-k\right)+\beta^2\left(q-k\right)^2\right)+D^O\left(1-s_I^O\right)-Cs_I^O \\
&= \frac{L^2-2L\beta\left(q-k\right)+\beta^2\left(q-k\right)^2}{2\alpha}+s_I^O\frac{\alpha^2 s_I^O+2\alpha\beta\left(q-k\right)-2\alpha D-2\alpha C}{2\alpha}+D^O \\
&= \frac{\left(L-\beta\left(q-k\right)\right)^2}{2\alpha}+D^O \\
&\quad +s_I^O\frac{\alpha t+\beta\left(p-k\right)-C+2\beta t\left(q-k\right)-2\alpha t-2\beta t\left(q-p\right)+2C-2\beta\left(p-k\right)-2Ct}{2t} \\
&= \frac{\left(L-\beta\left(q-k\right)\right)^2}{2\alpha}+\left(1-2t\right)s_I^O\frac{-\alpha t-\beta\left(p-k\right)+C}{2t}-t\alpha s_I^O+D^O \\
&= \frac{\left(L-\beta\left(q-k\right)\right)^2}{2\alpha}+\left(1-2t\right)\frac{\left(\alpha t+\beta\left(p-k\right)-C\right)\left(-\alpha t-\beta\left(p-k\right)+C\right)}{2\alpha t^2}-t\alpha s_I^O+D^O \\
&= \frac{\left(L-\beta\left(q-k\right)\right)^2}{2\alpha}-\left(1-2t\right)\frac{\left(\alpha t+\beta\left(p-k\right)-C\right)^2}{2\alpha t^2} \\
&\quad +\frac{\alpha t-\alpha t^2+\beta\left(q-k\right)-t\beta\left(q-k\right)-C+tC+\beta\left(p-q\right)-t\beta\left(p-q\right)-t\beta\left(p-q\right)}{t} \\
&= \frac{\left(L-\beta\left(q-k\right)\right)^2}{2\alpha}-\left(1-2t\right)\frac{\left(\alpha t+\beta\left(p-k\right)-C\right)^2}{2\alpha t^2}+\frac{\left(1-t\right)\left(\alpha t+\beta\left(p-k\right)-C\right)}{t} \\
&\quad +\beta\left(q-p\right)
\end{aligned}$$

B. Differences in equilibrium values

Net debt difference between settings O and F:

$$\begin{aligned} d^O - d^F &= \frac{(L-\beta(q-k))^2 - (L-\beta(q-p))^2}{2\alpha} \\ &\quad - (1-2t)\frac{(\alpha t+\beta(p-k)-C)^2 - C^2}{2\alpha t^2} + \frac{(1-t)(\alpha t+\beta(p-k)-C)+Ct}{t} - \frac{\alpha}{2} \\ &= \frac{\beta(k-p)}{2t^2\alpha} \\ &\quad \cdot \left(p\beta - k\beta - 2C + 2Lt^2 - 2t^2\alpha + 4Ct + 2kt\beta - 2pt\beta + kt^2\beta + pt^2\beta - 2qt^2\beta\right) \\ &= \frac{\beta(p-k)}{2\alpha t^2} \\ &\quad \cdot \left(\beta(p-k)\left(1+t^2\right) + 2t^2(\alpha - \beta(p-q) - L - C/t) + 2(1-t)(C-\beta(p-k))\right) \end{aligned}$$

Difference in firm value between settings O and F:

$$\begin{aligned} f^O - f^F &= \frac{1}{2t\alpha}\beta(k-p)(2C + k\beta - p\beta - 2t\alpha + 2Lt + kt\beta + pt\beta - 2qt\beta) \\ &= \frac{\beta(p-k)}{2\alpha t}(\beta(p-k)(t+1) + 2t(\alpha - \beta(p-q) - L - C/t)) \end{aligned}$$

Difference in firm value between settings F and N:

$$f^F - f^{NO} = \frac{(C - t(\alpha - \beta(p-q) - L))^2}{2t(t+1)\alpha}$$

C. Proofs

Proof of Proposition 1. The rightmost inequality follows trivially since $p > k$ by assumption. The leftmost inequality follows from Assumption A1 since,

$$D^F - D^N = (\alpha - \beta (p - q) - C/t - L) / (1 + t) .$$

■

Proof of Proposition 2. The left-most inequality follows trivially since $p > k$ by assumption. The rightmost inequality follows from Assumption A1 since,

$$s_L^F - s_L^N = (t (\alpha - \beta (p - q) - L) - C) / (\alpha (1 + t)) .$$

■

Proof of Proposition 3. The rightmost inequality follows since:

$$\begin{aligned} d^O - d^F &= \frac{\beta (p - k)}{2\alpha t^2} \\ &\quad \cdot \left(\beta (p - k) \left(1 + t^2\right) + 2t^2 (\alpha - \beta (p - q) - L - C/t) + 2 (1 - t) (C - \beta (p - k))\right) \end{aligned}$$

which is positive by Assumptions A1 and A2, and $p > k$.

The leftmost inequality follows by Proposition 5 and the fact that

$$e^N > e^F .$$

■

Proof of Proposition 4. The derivatives of the difference in net debt are given by:

$$\begin{aligned} \frac{\partial \left(d^O - d^F\right)}{\partial \beta} &= t^2 (p - k) \frac{\beta (q - k) + (\alpha - \beta (p - q) - L - C/t)}{\alpha t^2} \\ &\quad + (p - k) \frac{(C - \beta (p - k)) (1 - t) + t\beta (p - k)}{\alpha t^2}, \end{aligned}$$

and

$$\begin{aligned}
\partial\left(d^O - d^N\right)/\partial\beta &= \frac{q-k}{\alpha}\left(\alpha - L + \beta\left(q-k\right) + \left(C - \beta\left(p-k\right)\right)\left(1-2t\right)\right) \\
&\quad + \frac{\left(p-q\right)}{\alpha t^2\left(1+t\right)^2}\begin{pmatrix} \left(C-\beta\left(p-k\right)\right)\left(1-t^2\right) \\ +2t^3\left(\alpha - k\beta + q\beta - C/t - L\right) + 2\beta\left(p-k\right)t^2 \end{pmatrix} \\
&> \frac{q-k}{\alpha}\left(\alpha - L + \beta\left(q-k\right) - C + \beta\left(p-k\right)\right) \\
&\quad + \frac{\left(p-q\right)}{\alpha t^2\left(1+t\right)^2}\begin{pmatrix} \left(C-\beta\left(p-k\right)\right)\left(1-t^2\right) \\ +2t^3\left(\alpha - k\beta + q\beta - C/t - L\right) + 2\beta\left(p-k\right)t^2 \end{pmatrix}.
\end{aligned}$$

Both are positive by Assumptions A1 and A2, and $p > q > k$. ■

Proof of Proposition 5. The rightmost inequality follows by Assumption A1 and $p > k$ since:

$$f^O - f^F = \frac{\beta\left(p-k\right)}{2\alpha t}\left(\beta\left(p-k\right)\left(t+1\right) + 2t\left(\alpha - \beta\left(p-q\right) - L - C/t\right)\right).$$

The leftmost inequality follows immediately from:

$$f^F - f^N = \frac{\left(C - t\left(\alpha - \beta\left(p-q\right) - L\right)\right)^2}{2t\left(t+1\right)\alpha}.$$

■

D. List of model variables

d	net debt
e	expected value of equity in period 1
D	gross debt
C	cost of bankruptcy/restructuring
α	quantity of the stand-alone technology
β	quantity of the input
k	the supplier's opportunity cost of the input
q	productivity of the input
p	unit price of the input
s	signal realization
s_L	liquidation threshold
s_I	insolvency threshold
t	tax rate
N	no restructuring possible
F	financial restructuring possible
O	operational and financial restructuring possible
W	total surplus
Z	negative externality from liquidation

E. Treatment of Executory Contracts in insolvency - overview

Table 6 summarizes the treatment of executory contracts in the law of several countries, based on Chuah and Vaccari, eds (2023). Quotes are from the book. When laws differ across types of executory contracts, we have preferred the rules for property leases. **Restructuring** refers to whether there is an in-court legal procedure that does not automatically liquidate (e.g., Chapter 11 in the U.S., and Sauvegarde in France). **Unilateral rejection** refers to whether that procedure allows unilateral, unconstrained assumption and rejection decisions. **Ipso Facto** refers to whether some contracts clauses which refer to insolvency are enforced (such contracts mean that executory contracts are not controlled by insolvent firms). **Withhold performance** refers to whether counterparties can withhold performance on executory contracts to restructuring firms. The **Executory Contracts** score is set to zero for countries if any of these variables take on the values No, No, Yes and Yes, respectively. Cells are left empty when information is missing.

Table 6: **Executory Contract Treatment**

Country	Restructuring	Unilateral rejection	Ipso Facto	Withhold performance	Executory Contracts
United States	Yes	Yes	No		1
Australia	Yes	Yes	No		1
Bangladesh	No	Yes			0
UK	Yes	No	Yes		0
India	Yes	No			0
New Zealand	Yes	No	No		0
Singapore	Yes	No		Yes	0
Denmark	Yes	No		Yes	0
Finland	Yes	No	No		0
Lithuania	Yes	Yes	Yes	Yes	0
Albania	Yes	Yes			0
Argentina	Yes	No			0
Austria	Yes	Yes	Yes		0
China	Yes	Yes		Yes	0
Croatia	Yes	Yes	Yes		0
France	Yes	No	No		0
Germany	Yes	No	No		0
Greece	Yes	Yes	No		1
Italy	Yes	Yes	No		1
Japan	Yes	Yes	No		0
Netherlands	Yes	Yes	Yes	Yes	0
Panama	Yes	No			0
Russia	Yes	No			0
Slovenia	Yes	No			0
South Korea	Yes	Yes	Yes		0
Spain	Yes	No	No		0
Turkey	Yes	Yes			0
Canada	Yes	Yes	Yes		0
South Africa	No				0
UAE	No		No		0

F. Data collection procedures for Purchase Obligations from 10-K filings

Following the instructions in Moon and Phillips (2020), we collect purchase obligations data for firms filing 10-Ks in 2018 and 2019. We download the 10-K filings, including 10-K, 10-K405, 10KSB and 10KSB40, from the Notre Dame Software Repository for Accounting and Finance (SRAF) (McDonald 2024). According to the Disclosure in Management's Discussion and Analysis About Off-Balance Sheet Arrangements and Aggregate Contractual Obligations issued in 2003, firms, excluding small business, are required to comprehensively explain their off-balance sheet arrangements in a distinct subsection of the "Management's Discussion and Analysis" ("MD&A") section in filings. The amendment also mandates these firms to summarize specific known contractual obligations in a table format. "Purchase obligations" is explicitly listed as one of the five categories of contractual obligations that must be included in the disclosure table.[22]

While most firms disclose their purchase obligations in the required tabular format in Item 7, "MD&A", as shown in Figure 2 and 3, some firms don't. A thorough review of the 10-K filings reveals that some firms disclose purchase obligations in text rather than the mandated table format, while others report this information in Item 8, "Financial Statements and Supplementary Data", instead of Item 7. For the first case, we manually extract the text containing the purchase obligations information and convert it into the table format. In the second scenario, we incorporate the purchase obligations data from Item 8 into the main dataset, ensuring it is added only if it does not replicate information already extracted from Item 7.

To extract all purchase obligations related information from firms' 10-Ks, we first parse the filing document and extract the Item 7 and 8 sections. Then we use the search keywords to identify the table(s) or paragraph(s) that contain the information of interest. The search keywords in Moon and Phillips (2020) are combinations of "purchase" and one of the following words: "obligation", "commitment", "agreement", "order" and "contract". We combine these search keywords into a regular expression and use it to parse and extract the relevant row(s)/column(s) in the identified table(s) and/or the relevant sentences in the identified paragraph(s). For each filing, we clean and compile all extracted values into one dataset, recording (1) the specific name of each value in the "Purchase Obligation" category, (2) the corresponding period for the reported purchase obligation, and (3) the corresponding raw value extracted from the filing. Then,

[22]According to Securities and Exchange Commission (2003), the disclosure table must include five mandatory categories of contractual obligations: long-term obligations, capital lease obligations, operating lease obligations, purchase obligations, and other long-term liabilities reported on the registrant's balance sheet in accordance with GAAP.

Figure 2: **Disclosure for Purchase Obligations by eBay Inc. FY-2018**

Commitments and Contingencies

We have certain fixed contractual obligations and commitments that include future estimated payments for general operating purposes. Changes in our business needs, contractual cancellation provisions, fluctuating interest rates, and other factors may result in actual payments differing from the estimates. We cannot provide certainty regarding the timing and amounts of these payments. The following table summarizes our fixed contractual obligations and commitments (in millions):

Payments Due During the Year Ending December 31,	Debt	Leases	Purchase Obligations	Total
2019	$ 1,841	$ 136	$ 209	$ 2,186
2020	1,259	104	147	1,510
2021	983	91	128	1,202
2022	1,935	76	116	2,127
2023	1,284	51	38	1,373
Thereafter	5,220	119	—	5,339
	$ 12,522	$ 577	$ 638	$ 13,737

The significant assumptions used in our determination of amounts presented in the above table are as follows:

- Debt amounts include the principal and interest amounts of the respective debt instruments. For additional details related to our debt, please see "Note 10 – Debt" to the consolidated financial statements included in this report. This table does not reflect any amounts payable under our $2 billion revolving credit facility or $1.5 billion commercial paper program, for which no borrowings were outstanding as of December 31, 2018.
- Lease amounts include minimum rental payments under our non-cancelable operating leases for office space, data centers, as well as fulfillment centers and other corporate assets that we utilize under lease arrangements. The amounts presented are consistent with contractual terms and are not expected to differ significantly from actual results under our existing leases, unless a substantial change in our headcount needs requires us to expand our occupied space or exit an office facility early.
- Purchase obligation amounts include minimum purchase commitments for advertising, capital expenditures (computer equipment, software applications, engineering development services, construction contracts) and other goods and services entered into in the ordinary course of business.

Figure 3: **Disclosure for Purchase Obligations by Apple Inc. FY-2018**

Contractual Obligations

The following table presents certain payments due by the Company as of September 29, 2018, and excludes amounts already recorded on the Consolidated Balance Sheet, except for term debt and the deemed repatriation tax payable (in millions):

	Payments Due in 2019	Payments Due in 2020–2021	Payments Due in 2022–2023	Payments Due After 2023	Total
Term debt	$ 8,797	$ 18,933	$ 17,978	$ 58,485	$ 104,193
Operating leases	1,298	2,507	1,838	3,984	9,627
Manufacturing purchase obligations (1)	41,548	2,469	1,183	–	45,200
Other purchase obligations	3,784	2,482	681	66	7,013
Deemed repatriation tax payable	–	5,366	5,942	22,281	33,589
Total	$ 55,427	$ 31,757	$ 27,622	$ 84,816	$ 199,622

we determine the reporting unit for each extracted value from the subsection where the table or paragraph is located. The reporting unit is then appended back to the main dataset and we use it to normalize all values to dollar amounts.

After gathering and cleaning all purchase obligations data, we apply two additional filters. First, we filter out identified purchase obligation items for financial instruments, assets or liabilities.[23] Second, we retain only the values for all future purchase obligations and those due within the next year or the next 12 months. While some firms specify their purchase obligations for each upcoming year (e.g., Figure 2), others aggregate their future obligations over multiple years (e.g., Figure 3). Finally, when multiple items ex-

[23]We exclude the extracted items with "equity", "share", "stock", "loan", "bond", "capacity", "asset" or "liabilities" in their identified names.

tracted from the same table or paragraph of a filing are under the “Purchase Obligations” category, we aggregate these individual items to derive a comprehensive measure of the firm’s total purchase obligations due within a specified time frame.