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Should Insolvency Law Cover Non-Financial Obligations? Contract Rejection and Debt Capacity

Finance Working Paper N° 937/2023
October 2026

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Abstract

Non-financial obligations created by long-term contracts such as leases are often large, exceeding financial debts in a quarter of U.S. firms. Their treatment in insolvency varies: Chapter 11 allows firms to freely reject or assume contracts, but many other restructuring regimes do not allow rejection. We model regimes with and without the rejection option. This option prevents excessive liquidation of insolvent firms and increases firms' debt capacity. Using novel measures of executory contracts by industry, and three difference-in-difference settings, we confirm that leverage and loan flow increase when the rejection option is available.

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October 4, 2026

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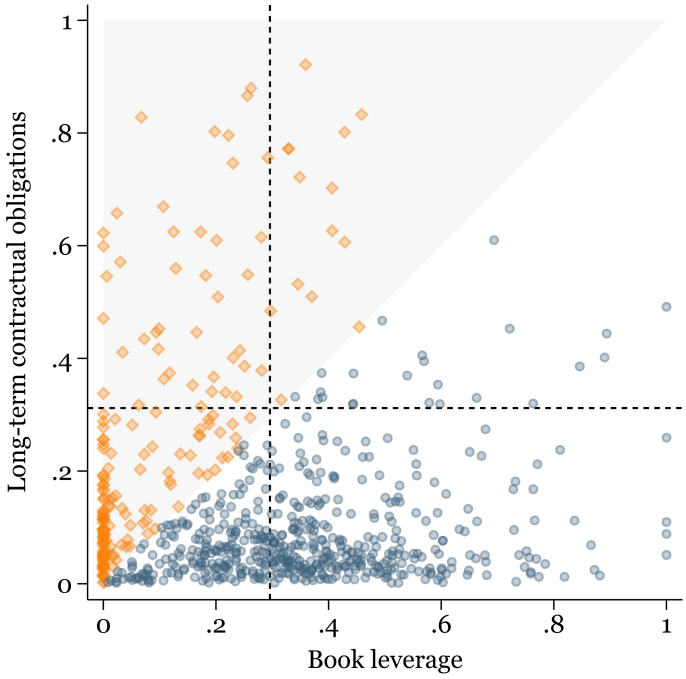
1. Introduction

Non-financial obligations are created by, for example, leases, rental agreements, long-term purchasing contracts, and intellectual property (IP) sharing agreements. Figure 1 illustrates this for a cross-section of large public companies in the U.S. in 2018. The mean value of non-financial obligations in this sample is 13.0% of book assets, and mean book leverage is 29.6%. The value of non-financial obligations exceeds financial debts for a quarter of firms in this sample.

Figure 1: **Financial and non-financial obligations of U.S. firms**



This figure plots the value of executory contracts divided by book assets (winsorized at one) against book leverage (winsorized at one). The sample is U.S. firms with market capitalization exceeding $1 billion in 2018. Dotted lines indicate mean values for the x and y variables. Orange diamonds denote firms where non-financial obligations exceed leverage, and blue circles those where debt is larger. The measurement of non-financial obligations is described in the data section.

Because non-financial obligations are comparable to financial debts in magnitude,

they often pose an important challenge for insolvent firms. However, the system for managing insolvency and distress in many countries has no tools for changing these obligations.[1] We model the implications of different systems for handling non-financial obligations in insolvency, on insolvency outcomes and on credit markets. Our starting point is that non-financial obligations can impede the continued operation of a business, or, in other words, make it non-viable, just like financial debts. Outside of a formal process it may be difficult or impossible to renegotiate contracts due to both hold-up and free-riding problems. Therefore, just as with debts, handling large non-financial claims in distress may require a formal procedure.[2] Non-financial claims are often large in U.S. bankruptcy cases: in Ayotte's (2015) sample of large Chapter 11 cases, lease obligations (a subset of long-term obligations) constitute 23 percent of liabilities and, at the 90th percentile, as much as 70 percent of liabilities.

In Chapter 11 of the U.S. Bankruptcy Code, a few categories of claims – notably financial claims and collective bargaining agreements – are subject to special rules, but for 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, 2021), and licensing agreements. Under Section 365 of the Bankruptcy Code, 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.[3] Examples of bankruptcy cases where this was important include Kmart and Hertz. For Kmart, the number of leases was large and the company sold

[1] Note that outside of the U.S., restructuring is typically separate from bankruptcy. When we refer to 'insolvency law', we think primarily of any processes that do not liquidate: e.g., U.S. Chapter 11 bankruptcy, the UK Scheme of Arrangement, or the various national processes covered by the EU insolvency directives. Our sample period ends in 2023. Under a recent EU directive, some European countries introduced rejection options.

[2] Thinking of non-financial and financial contracts in similar terms is a natural implication of the Jensen and Meckling (1976) nexus-of-contracts view of the firm. See, e.g., Casey (2020) and Antill and Grenadier (2019).

[3] A rejected contract creates losses for the counterparty, and these become general, unsecured claims. Recovery is often, but not always, zero for these claims. From the point of view of the viability of the firm, any obligations are discharged at exit from bankruptcy. To simplify, we can think of rejected claims as disappearing.

rejection rights to a third party in order to reach decisions quickly (Gilson and Abbott, 2009). Hertz, which at the time of its Chapter 11 process leased almost half a million vehicles under a "master lease agreement", rejected some leases and retained others, adapting 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.[4]

Outside of the U.S., it has remained rare for restructuring law to explicitly involve operational claims the way Chapter 11 does, and especially rare to give unconstrained rights to the debtor company to reject contracts as in the U.S.[5] 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 equilibria under a restructuring process which allows adjusting both types of obligations (Chapter 11) and one limited to financial claims (most other processes).[6]

When both operational and financial claims are addressed simultaneously, it becomes more likely that firm liabilities can be sufficiently reduced for the business to survive. In the model, the option to reject executory contracts strengthens the bankrupt firm's bargaining power versus 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.

Our model connects the option to reject contracts to *ex post* restructuring outcomes as well as *ex ante* capital structure. In testing the empirical relevance of this model, we focus on the prediction that when executory contracts cannot be rejected, financial leverage should be lower. We test this by sorting industries based on the

[4]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. See Benmelech and Bergman (2011) for a discussion of airline insolvency.

[5]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 (the Italian law falls short of U.S. law in that contracts can be assumed but not assigned to a third party). 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.

[6]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). In principle, various features interact.

amount of executory contracts that are typical for U.S. firms in the industry. For this we use 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 (2021). The overall value of contractual obligations is high: across all firms the median is 7.7% of book assets. This firm-level evidence agrees with Ayotte's (2015) findings that executory contracts are large in many Chapter 11 cases. 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, airplane and ship manufacturing has few leases but significant long-term purchasing contracts, and mining, oil and gas as well as finance tend to have limited obligations. For cross-jurisdiction tests, we assume that this U.S. ordering is relevant to each industry's contractual obligations everywhere. This seems plausible, given that the industries with significant executory contracts are industries that are heavy users of commercial real estate (e.g., Apparel and Retail) or have a lot of suppliers (e.g., Wholesale, Food Products) – this ranking appears to identify inherent industry characteristics.

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).[7] Second, we compare Israeli firms before and after a new law, introduced in 2019, which allowed rejection of contracts.[8] 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 25th to the 75th percentile corresponds to an increase of debt outstanding of 7%, relative to a country without the rejection option. The Israeli before- and after tests produce similar magnitude estimates. Third, we also test the model's predictions in lending data from Dealscan, i.e., in loan flow data for broadly syndicated loans. High executory contract industries are associated with higher credit volumes in the U.S., consistent with an effect of

[7]A non-U.S. company may file for Chapter 11 in the U.S. provided it "resides or has a domicile, a place of business, or property in the United States" (11 U.S.C. § 109(a)). However, this is expensive and rare: Jang et al. (2025) identify merely 78 Chapter 11 filings by non-U.S. parent firms from 25 countries over 2001–2020. Non-U.S. firms instead mainly use Chapter 15, which recognizes a foreign proceeding.

[8]The reform also made significant changes to consumer bankruptcy (Ofir, Berzani and Stein (2025)).

operational restructuring rules on the debt capacity (higher) and capital structure choices (more debt) of firms.[9]

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 increase 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, in line with prior work finding that reforms in Brazil, India and Italy affected debt capacity and real outcomes (Ponticelli and Alencar (2016), Vig (2013) and Rodano, Serrano-Velarde and Tarantino (2016)).

The remainder 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 results. In Section 4, we describe the empirical method and present our empirical results, and in Section 5, we conclude. A list of variables, the equilibrium outcomes, assumptions and proofs can be found in the Appendix, together with 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.[10] 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

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

[10]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).

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.[11] 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).[12] 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.

Dealing with executory contracts is important to U.S. bankruptcy, according to several papers. Using hand-collected data on firms that filed for Chapter 11 during the period 1991 to 2004, Lemmon, Ma and Tashjian (2009) show that 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. For airlines, Benmelech and Bergman (2008) show that renegotiation of lease commitments is key in Chapter 11 processes. Ma and Tashjian (2015) establish that the value of operating leases raises the likelihood that a firm will file for Chapter 11 (rather than restructure out of court), underlining the usefulness of Section 365.

Outside of the U.S., rejection of executory contracts is more difficult. Dávalos (2017) compares the U.S., German, and Spanish systems and finds that the Spanish system gives weaker 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 law – the Insolvency and

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

[12] 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.

Economic Rehabilitation Law, 5778-2018 – in force since September 2019, codified a flexible treatment of executory contracts in restructuring proceedings. The law gives a debtor 90 days from the start of proceedings to file a motion to reject a contract, and rejection is allowed if it is necessary for rehabilitation and can increase creditor recovery, relatively easy tests. Counterparties of rejected contracts have an unsecured claim on the estate. The new rule is 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. Finally, several countries have implemented reforms relevant to executory contracts so recently that they are not covered by our sample.

3. Theoretical analysis

3.1. Framework

We develop a simple three-period model of a firm with financial and non-financial obligations that may become distressed and restructure.

In period 1, two or more identical suppliers offer to supply the firm with x units of an input. Each supplier produces the input at a cost of c per unit, quotes a unit price no less than k, and maximizes expected profits. Here $k \in (0, c)$ is the value of the input in its best alternative use, and thus the supplier's outside option once the input has been produced.

In period 2, the firm signs an executory contract with the supplier offering the

lowest unit price p.[13] If several suppliers offer the lowest price, the firm signs with one of them chosen at random. The firm simultaneously chooses the face value of debt.[14] The objective is to maximize expected firm value. Capital markets are competitive with a continuum of identical risk-neutral creditors and a risk-free rate normalized to zero.

Between periods 2 and 3, the realization of a random variable $\theta \sim U[0,1]$ becomes publicly observable. It fully determines firm revenues, $q\theta + x\psi$. The term $q\theta$ is the stochastic revenue from the firm's owned assets, where $q > 0$ measures their scale and θ their realized productivity per unit. The term $x\psi$ is the deterministic revenue from the contracted input, whose unit productivity $\psi > k$ exceeds its value in the best alternative use.

In period 3, the payment for the input, xp, and the face value of debt, D, become due. If revenues cover obligations, the firm is solvent and profits are taxed at rate $t \in (0,1)$, after which the game ends. Otherwise the firm enters bankruptcy and is either liquidated or restructured by a bankruptcy court that maximizes the realized firm value. Executory claims have priority over financial claims in bankruptcy, whereas the unsecured claim associated with a rejected contract receives no recovery (as noted in the introduction, general unsecured claims may sometimes have positive recovery, but the intuition we develop does not depend on this payoff being zero). Bankruptcy entails a cost $C > 0$, and liquidation yields a gross payoff of L and a net payoff of $L - C > 0$ to creditors.

The tax rate t creates an incentive for the firm to increase leverage, while the bankruptcy cost C limits borrowing. We impose four parameter restrictions, stated in Appendix C and maintained throughout. They ensure interior solutions, in particular bankruptcy costs are neither too large nor too small relative to the tax rate.

We solve the game for a subgame-perfect equilibrium in pure strategies under two bankruptcy regimes.[15] We first discuss the intuition for the equilibrium outcomes

[13] As discussed in the introduction, executory contracts involve outstanding obligations on both sides and may arise when spot markets are incomplete, due to asymmetric information (Fudenberg et al., 1990), bounded rationality (Bolton and Faure-Grimaud, 2010), or to limit renegotiation costs (Klein et al., 1978; Halonen-Akatwijuka and Hart, 2020).

[14] Remark C.1 in Appendix C shows that the firm prefers signing the equilibrium contract to forgoing the input.

[15] By Proposition C.1 such equilibria exist and their outcome is unique.

and then compare them. Appendix A lists variables, Appendix B reports equilibrium outcomes, and Appendix C provides formal derivations.

3.2. Equilibrium outcomes

Bankruptcy regimes

We will study the above model under two different bankruptcy regimes, $i \in \{F, O\}$:

F. *Financial restructuring.* The firm may write down debt and eliminate equity as an alternative to a liquidation, similar to standard European Union restructuring procedures. In the model, the write-down is implemented by the bankruptcy court, but alternatively this could be achieved *out of court* by a bond trustee who coordinates and bargains on creditors' behalf.[16]

O. *Operational and financial restructuring.* In addition to a financial restructuring, the firm may reject executory contracts. This regime corresponds most closely to Chapter 11 of the U.S. Bankruptcy Code. The option to reject the executory contract increases the firm's bargaining power relative to the supplier. We model this by allowing the bankruptcy court to make the supplier a take-it-or-leave-it offer of a new unit price. The supplier accepts if the offer weakly exceeds its outside option. This 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.[17]

[16] For example, Norwegian bond trustees typically have contractual rights to make payment changes on behalf of investors. Such an arrangement is not possible in the U.S., but out-of-court solutions may occur in other ways (see Bolton and Scharfstein, 1996).

[17] Renegotiation may fail without a rejection option for several reasons. Because executory claims have priority over financial claims in our model, the supplier has little incentive to renegotiate when debt write-downs avoid liquidation. When revenues are sufficiently low, the firm may also lack the resources to match the supplier's outside option. Finally, coordination frictions may arise if executory claims are dispersed across many small claimants.

Insolvency

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

$$q\theta + x\psi - xp - D \geq 0, \tag{1}$$

i.e. for θ above θ_I, defined as:

$$\theta_I := (D + xp - x\psi)/q. \tag{2}$$

Rejection and liquidation

For productivity realizations θ below θ_I, the bankruptcy court will restructure or liquidate the firm. As explained above, under regime F this entails writing down debt. Under regime O, the bankruptcy court will also use the rejection option to renegotiate the firm's contract with the supplier, lowering the effective unit price paid for the input from p to k. We capture the price difference by letting $P(i)$ denote the effective unit input price paid under restructuring regime $i \in \{F, O\}$, where $P(F) = p$ and $P(O) = k$. The value of debt is greater with ongoing operations than in a liquidation provided:

$$q\theta + x\psi - xP(i) - C \geq L - C. \tag{3}$$

Hence, the bankruptcy court restructures the firm whenever $\theta_L^i \leq \theta < \theta_I$, where the liquidation threshold is given by

$$\theta_L^i := \frac{L + xP(i) - x\psi}{q}, \tag{4}$$

and liquidates the firm whenever $\theta < \theta_L^i$. Since operational restructuring relaxes contractual obligations in distress, it reduces the liquidation threshold, implying that $\theta_L^F > \theta_L^O$. Liquidation is therefore more likely under financial restructuring.

Face value of debt

The firm chooses the face value of debt that maximizes the firm value, which is the sum of the expected values of equity and debt. Under bankruptcy regime i, the expected values of equity and debt in period 2 given face value D and effective restructuring unit price $P(i)$ can be expressed as follows:

$$e^i = (1-t)\int_{\theta_I}^{1}(q\theta + x\psi - xp - D)\,d\theta, \tag{5}$$

$$d^i = (L-C)\int_{0}^{\theta_L^i} d\theta + \int_{\theta_L^i}^{\theta_I}(q\theta + x\psi - xP(i) - C)\,d\theta + D\int_{\theta_I}^{1} d\theta. \tag{6}$$

The value of equity equals the expected value of after-tax profits. The value of debt is the weighted sum of three terms: the value if the firm is liquidated, the expected revenue net of the payments to the supplier and bankruptcy costs if the firm is restructured, and the full repayment of the face value of debt when the firm is solvent (we assume all of the face value of debt is tax deductible).

The optimal face value of debt satisfies the first-order condition:[18]

$$t\,(1-\theta_I) = \frac{C - x\,(p - P(i))}{q}. \tag{7}$$

The left-hand side is the marginal tax benefit of debt. A unit increase in the face value lowers taxes by t whenever the firm is solvent. The right-hand side is the marginal bankruptcy cost of debt. A unit increase in the face value raises the probability of insolvency by $1/q$ resulting in bankruptcy cost C net of the reduction $x(p - P(i))$ in contractual obligations that a restructuring brings about. Under financial restructuring this reduction is zero, but under operational restructuring it lowers the input price from p to k, partly offsetting the bankruptcy cost. Solving (7) gives the insolvency threshold:

$$\theta_I^i := 1 - \frac{C}{qt} + \frac{x\,(p - P(i))}{qt}, \tag{8}$$

[18]Firm value is concave in D over the range in which the insolvency threshold is below one and above the liquidation threshold. See the proof of Proposition C.1 in Appendix C.

and, by (2), the optimal face value of debt:

$$D^i := q + x\psi - xp - C/t + x\left(p - P(i)\right)/t. \tag{9}$$

For a given input price, the rejection option therefore raises both the face value of debt and the probability of insolvency. We show in Appendix C that the face value of debt is also larger under operational restructuring at the equilibrium prices.

Input price

In equilibrium, the suppliers will set prices so that they break even in expectation. Under bankruptcy regime F this implies

$$(p-k)\left(1-\theta_L^F\right) \quad = \quad c-k, \tag{10}$$

whereas under O it implies

$$(p-k)\left(1-\theta_I^O\right) \quad = \quad c-k. \tag{11}$$

Only the smallest prices that satisfy these conditions, denoted p^F and p^O, can be sustained in equilibrium. At any higher price at which suppliers earn nonnegative expected profits a supplier could profitably undercut its rivals. Since the supplier is less likely to be paid in full with operational restructuring, $p^O > p^F$.[19]

3.3. Comparing the two bankruptcy regimes

Thresholds

Substituting the equilibrium prices into the insolvency and liquidation thresholds yields the following ordering.

Proposition 1 *Under both regimes, the insolvency and liquidation thresholds belong*

[19] For a formal proof of the price difference, see Corollary C.1 in Appendix C.

to the open unit interval. They can be ordered as follows:

$$\theta_L^O < \theta_L^F < \theta_I^F < \theta_I^O.$$

The leftmost inequality reflects the option to renegotiate. Because the firm's obligation to the supplier is k under O rather than p^F under F in an operational restructuring, continuation is more attractive than liquidation over a wider range of realizations, and $\theta_L^F - \theta_L^O = x\left(p^F - k\right)/q$. The middle inequality follows from Assumptions A3 and A1 in Appendix C, which guarantee a nonempty range of realizations over which the court restructures rather than liquidates. The rightmost inequality follows because the marginal cost of default from a higher face value of debt is lower under operational restructuring than financial restructuring. The reason is that the contract concession offsets part of the bankruptcy cost, which leads the firm to accept a higher probability of insolvency.[20]

Leverage

We are now ready to state the main implication of the model. Operational restructuring raises leverage and strengthens its sensitivity to the scale of executory contracts. Figure 2 illustrates both parts for a parameterization satisfying all assumptions.

Proposition 2 *The following holds for leverage under the two bankruptcy regimes:*

i. $d^F/e^F < d^O/e^O$,

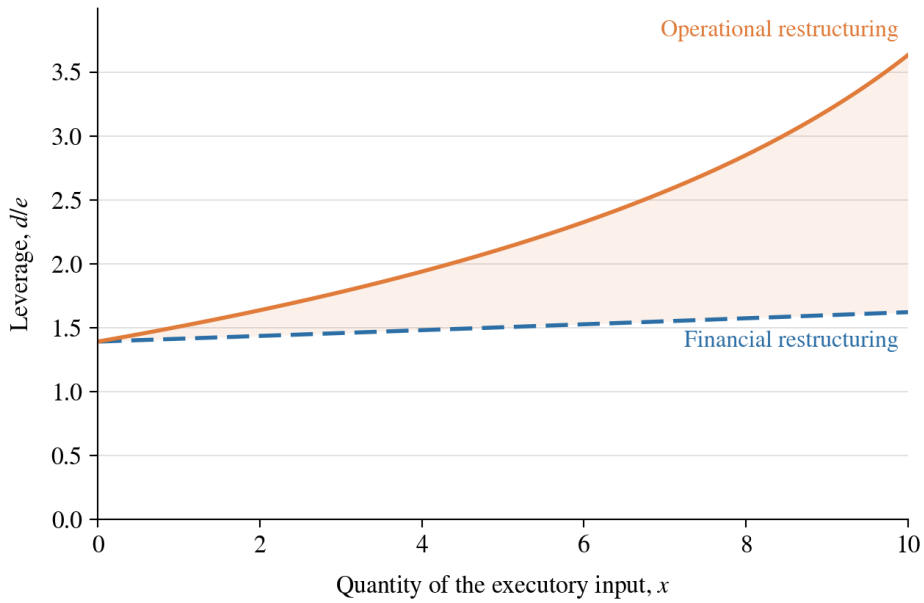
ii. $\dfrac{\partial\left(d^F/e^F\right)}{\partial x} < \dfrac{\partial\left(d^O/e^O\right)}{\partial x}$.

Part i. combines the two forces identified above: operational restructuring raises ex ante debt capacity by improving creditor recovery in distress, but it also makes insolvency more likely. Even when the second force lowers the market value of debt, which can happen when the tax rate is high, the value of equity falls proportionally more, so leverage is higher. Part ii. follows because the value of equity declines with the contract size under operational restructuring, but is unaffected under financial restructuring.[21]

[20] For a formal proof of the difference in face value, see Lemma C.2 in Appendix C.

[21] Both results extend to a setting in which the firm *chooses the contract size* x, industries differ in

Figure 2: **Leverage as a function of contract size**



This figure plots equilibrium leverage, d/e, as a function of the quantity of the input, x. The other parameters are as follows: $q = 30$, $k = 0.3$, $\psi = 0.5$, $c = 0.35$, $t = 0.2$, $C = 4$, $L = 5$. Leverage is higher under operational restructuring at every x and rises more steeply with x, as in Proposition 2. The shaded area is the difference between the two. The plotted range is a subset of the admissible range $(0, 13.33)$ implied by the assumptions in Appendix C.

Welfare

We conclude the theory section by comparing total surplus, W^i, under the two bankruptcy regimes. Total surplus is the sum of the expected payoffs of creditors, shareholders, the supplier, and the government, so taxes are a transfer. We allow for the possibility that a liquidation entails a negative externality $Z \geq 0$. This could, for example, represent losses of firm-specific physical and human capital (Graham et al. (2023)) or negative effects of liquidation on other firms (Bernstein et al. (2019)). In a liquidation, the input is redeployed to its best alternative use, where it is worth k per unit. Total surplus then

productivity, and revenue is concave in x. Derivations are available from the authors upon request.

differs by:

$$W^O - W^F = \int_{\theta_L^O}^{\theta_L^F} (q\theta + x(\psi - k) - L + Z)\, d\theta - C \int_{\theta_I^F}^{\theta_I^O} d\theta \tag{12}$$

$$= \frac{x\left(p^F - k\right)}{q}\left(\frac{x\left(p^F - k\right)}{2} + Z\right) - \frac{x\left(p^O - k\right)C}{qt}. \tag{13}$$

The first term is the private and external gain from the lower probability of liquidation; the second is the additional expected bankruptcy cost from the higher probability of insolvency. Which dominates depends on the parameter values.

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 operational restructuring and higher in a system that allows operational restructuring (Proposition 2). We examine this empirically in an international cross-section of capital structure data. We use two sources of identification empirical approaches. First, we consider Chapter 11 more capable of operational restructuring than other systems, and run cross-country capital structure regressions. We also use this identification strategy for new loans, since flows may provide finer variation than stocks. Second, the 2019 new Insolvency and Economic Rehabilitation Law in Israel established that contracts could be rejected with few conditions – 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).[22] The Israeli reform was comprehensive and central: the new law is "the

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

primary legislation governing insolvency in Israel" (Arzi et al., 2025). The rest of this section presents data sources and empirical tests.

4.1. Data

We employ three 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 loan flows. Third, we use text analysis to extract information about Long-term Purchase Agreements from 10-K filings.

Firm-level capital structure data come 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 2023 dollars.

Executory contracts

We use two main sources of data on executory contracts. 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, and, most importantly, means that we can test our theory outside of the U.S., where we do not have data for all the components of our measure.

We employ 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.[23] Additionally, we use data on leases from IFRS accounting

[23]Theoretical support for this can be found in an extension of the model in which the firm chooses

variables available internationally to verify that the lease part of our executory contracts measure is reflective of non-U.S. firms. For the purchase agreement component of executory contracts, we have no independent verification of our assumption.

The first component of executory contracts is lease obligations, measured using rental expense from Compustat-CapitalIQ, scaled by three to approximate typical contractual commitments. This income-statement-based measure is available for a broad cross-section of firms and is unaffected by the change in lease capitalization rules introduced after 2018.[24] Results are qualitatively unchanged if we scale by two, four, or five instead of three. For the firm-level data used in Figure 1, we apply the same measure (three times annual rental expense plus purchase obligations), and censor the ratio of executory contracts to assets at one.

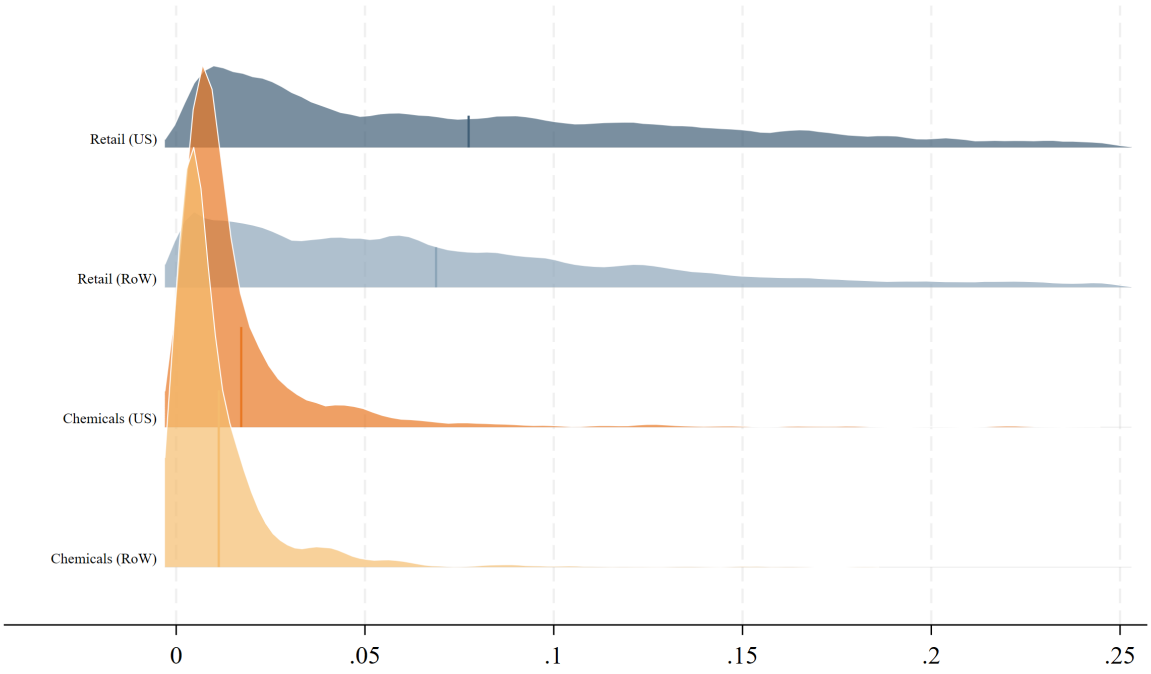
The second component of executory contract use is based on text parsing of 10-K filings at SEC, following Moon and Phillips (2021). Since an SEC ruling in 2003, firms are required to include tables with purchase obligations in their 10-Ks, together with leases (which we ignore, since we have their value from financial statements). The detailed process for extracting the purchase obligation data is described in the Appendix. This component of our industry measure is only available for firms reporting in the US. For consistency, we therefore construct the combined measure for only U.S. firms.

Our two main measures of executory contract intensity in each industry are the (median across all firms with data of) lease and rent liabilities and long-term purchase agreements, both normalized by assets. The industry-level variables appear very stable over time (results are similar if we use individual years to form the executory contracts variable). For the lease component which we can compute outside the U.S., industry values are similar abroad. Figure 3 shows how the distributions of leases compare across U.S. and non-U.S. OECD firms in two selected industries (one with high and one with low use of leases). In both industries, U.S. firms have slightly higher

the contract size and industries differ in the productivity of the executory input. In that setting, the *ranking* of industries by contract size is the same under both bankruptcy regimes. Derivations are available from the authors upon request.

[24]The lease measure is constructed as three times the annual rental expense (`xrent`) from Compustat, which approximates typical contractual commitments. Unlike balance sheet lease commitment schedules (`mrc`, `cld`), rental expense is reported consistently across firm sizes and time periods, and avoids the splice introduced by the change in lease capitalization rules after 2018 (see Ma (2020)). We have tried using only post-2018 data to construct the industry measure, with similar results.

Figure 3: **Distribution of lease payments in two industries: U.S. and abroad**

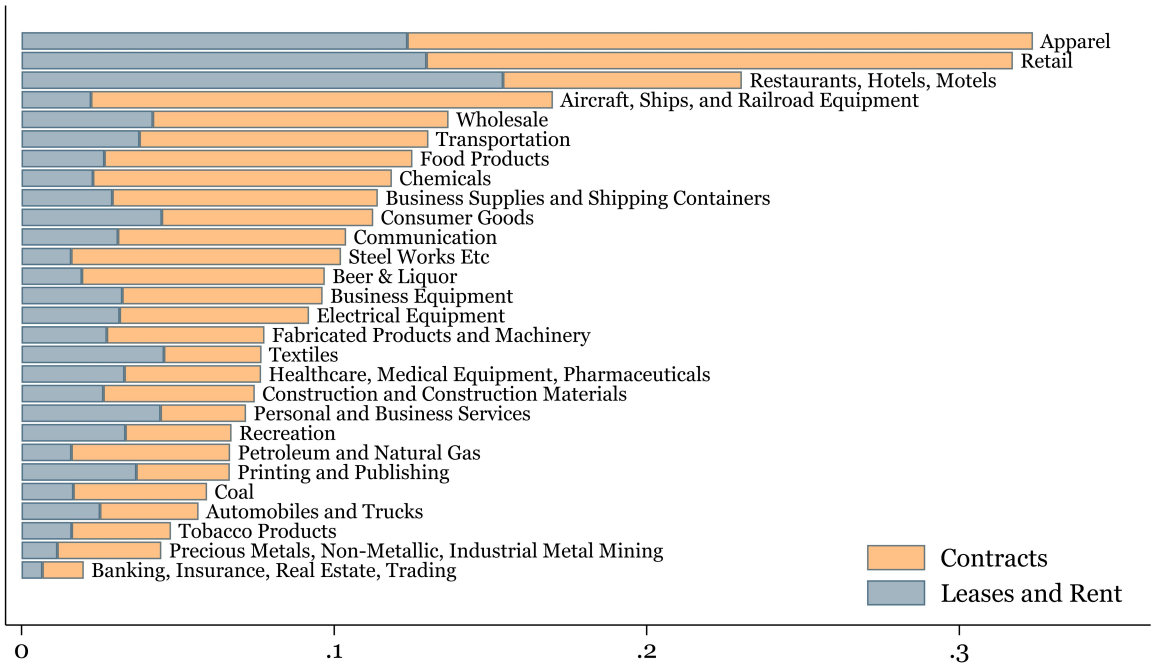


This figure plots the distribution of leases over assets for U.S. and non-U.S. OECD firms, respectively, for two selected industries: Retail (in blue) and Chemicals (in orange), respectively. U.S. firms are above in darker shades, non-U.S. below in lighter shades.

use of leases, but notably, the ranking is consistent: retail firms have a higher mean and a distribution shifted to the right compared to Chemicals. This is also true for non-OECD firms. The R-squared in a firm-level regression of leases (divided by assets) on our industry measure is 0.14 for U.S. firms and 0.13 for foreign firms. We conclude from these results that our measure captures a persistent and cross-national feature of industries.

Median amounts of executory contracts are reported in Table 1 for Fama-French 30 industries. The values are also plotted in Figure 4. 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

Figure 4: **Executory contract use by industry**



This figure plots the value of two components of executory contracts, as a fraction of book assets, for 30 Fama-French industries.

(this is part of Banking, Insurance, Real Estate, Trading, industry number 29).[25] In the table, the "Purchase obligation share of executory contracts" is the median amount of purchase-obligation ratio divided by the median executory-contract ratio. The industries with the highest amount of obligations under executory contracts are Apparel (7), Retail (27) and Restaurants, Hotels and Motels (28). Notably, Aircraft, ships and railroad equipment (16) is also high. The mix differs: while retail has a lot of rent and lease payments, Aircrafts 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). In contrast, industries Tobacco (3); Precious Metals and Mining (17) and Finance (29) have low use of executory contracts (i.e. low values for all components). At the firm

[25] Results are similar with alternative definitions using 12 or 44 industries instead of 30.

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

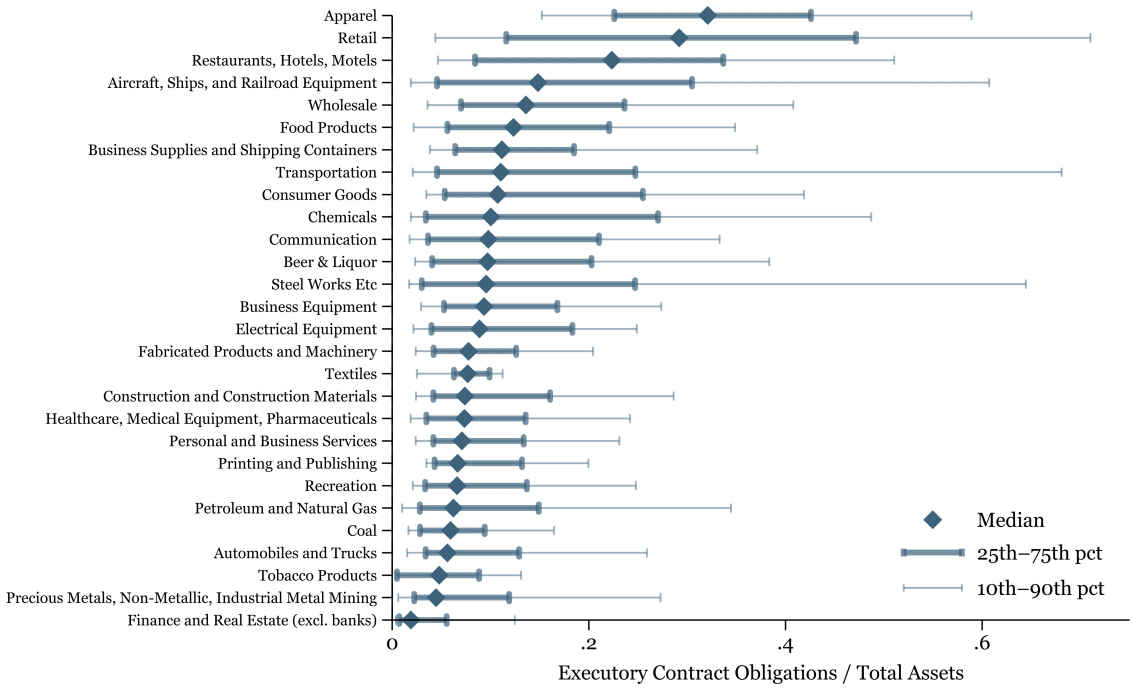
Fama-French 30 Industry	**Executory contracts over assets**	**Purchase obligations share of exec. contracts**
Apparel	0.324	39%
Retail	0.317	20%
Restaurants, Hotels, Motels	0.230	18%
Everything Else	0.184	42%
Aircraft, Ships, and Railroad Eq.	0.170	76%
Wholesale	0.137	51%
Transportation	0.130	41%
Food Products	0.125	66%
Chemicals	0.118	70%
Business Supplies and Shipping Containers	0.114	56%
Consumer Goods	0.113	39%
Communication	0.104	36%
Steel Works Etc	0.102	60%
Beer & Liquor	0.097	70%
Business Equipment	0.096	63%
Electrical Equipment	0.092	72%
Fabricated Products and Machinery	0.078	50%
Textiles	0.077	22%
Healthcare, Medical Equipment, Pharma.	0.077	49%
Construction and Construction Materials	0.075	51%
Personal and Business Services	0.072	30%
Recreation	0.067	47%
Petroleum and Natural Gas	0.067	32%
Printing and Publishing	0.067	31%
Coal	0.059	49%
Automobiles and Trucks	0.057	65%
Tobacco Products	0.048	35%
Precious Metals and Mining	0.045	45%
Finance and Real Estate (*excl. banks*)	0.020	34%

level, executory contracts have a 25th percentile of 0.040 and a 75th percentile of 0.206, with an interquartile range of 0.166. The industry level measure we use has a standard deviation (across 29 industries) of 0.072.[26]

[26]Across FF30 industries, the executory contracts cross-industry measure is not related to either

The value of executory contracts differs considerably across industries, but how much within industries? Figure 5 shows the range of values for each industry in the sample. The figure shows that median differences are reflective of other parts of the distribution. As an alternative industry measure, we use the average for each industry, after winsorizing at the 1% and 99% level.

Figure 5: **Range of executory contracts by industry**



The figure plots the total value of executory contracts, as a fraction of book assets, for each industry.

Other data

To measure corporate capital structures for a cross-country sample of firms, we employ data from Compustat-CapitalIQ. We use accounting data (e.g., leverage, profitability,

tangibility (Rajan and Zingales, 1995) or liquidity (Berger et al., 1996 and Almeida and Campello, 2007): the correlation of our industry measure with the industry medians of these measures are 0.067 and 0.147, respectively.

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 short-term plus long-term debt to assets and Debt-to-EBITDA as the ratio of short-term plus long-term debt to EBITDA. We drop observations where leverage lies outside [0,1] or Debt-to-EBITDA lies outside [0,15]. Summary statistics for leverage and Debt-to-EBITDA for 2022 are presented in Table 2. We also use an indicator variable for high leverage, which is defined as leverage over 0.35 or Debt-to-EBITDA above 4 (these values are close to the 75th percentile).

Table 2: **Summary statistics dependent variables**

	10th Perc.	Mean	90th Perc.	Std. Dev.	Obs
			Leverage		
Israel	0.010	0.273	0.603	0.232	550
U.S.	0.012	0.287	0.616	0.237	4,187
Rest of World	0.004	0.207	0.467	0.185	26,989
			Debt/EBITDA		
Israel	0.292	4.068	8.980	3.484	334
U.S.	0.268	3.294	7.385	2.947	2,068
Rest of World	0.078	2.883	7.299	3.091	19,753
			High Leverage (indicator)		
Israel	0.000	0.408	1.000	0.492	551
U.S.	0.000	0.405	1.000	0.491	4,208
Rest of World	0.000	0.308	1.000	0.462	27,011

Summary statistics for various subsamples. Data are for the last year of the firm sample (2022) and excludes utilities and banks. High Leverage is an indicator equal to one if either variable exceeds a value close to the 75th percentile of the sample.

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 around 400 thousand loans. We aggregate amounts by Fama-French industry, year, and country. There are 8,010 observations out of a potential total of around 65 thousand (14 years, 29 industries, 161 countries); singleton cells are dropped. For robustness tests, we focus on OECD countries only, which produces a sample of 4,343 observations.[27] We examine the total amounts of new term loans, and calculate several control variables as straight averages of loans in a cell - the fraction of 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 is unique. In an overview of the treatment of executory contracts in distress, Chuah and Vaccari, eds (2023) collect 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.

Given that insolvency rules for executory contracts differ, we may wonder how accurate our industry-level measure is for non-U.S. firms. We have used industry

[27] 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.

medians for non-U.S. firms in Compustat (i.e., firms with foreign headquarters, which may be more subject to non-U.S. law) to form an alternative industry-level measure of executory contracts. We exclude industry cells with less than ten firm observations. Both components (long-term contracts and leases) are similar in this sample, and the top three industries remain the same. We use this alternative variable in robustness tests below.

Table 7 in Appendix D 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 firms where important contracts were rejected), and in some cases we have not managed to identify how long these rules have been in place in practice (the Italian rejection option was introduced in 2012). We re-estimate 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 Table 7) in robustness tests reported below.

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. Countries other than the U.S. sometimes allow restructuring of executory contracts (see next section for an example), but generally with some restriction (Dávalos, 2017). Our empirical hypothesis is therefore that for firms in industries with high executory contract intensity, leverage should be higher in the U.S. than elsewhere. We use standard two way fixed effects (TWFE) regressions (Roth et al.,

2023). The regression equation is:

$$d_{it} = \theta X_{it} + \gamma E_j I_c^{treated} + \lambda G_{j\times t} + \eta H_{c\times t} + \epsilon_{it} \tag{14}$$

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, $I_c^{treated}$ U.S., 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 industry-year.

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

	(1)	(2)	(3)
	Leverage	Debt/EBITDA	High Leverage
Dependent var. mean	0.228	2.799	0.340
Executory contr. / Assets	**0.094*****	**1.641*****	**0.228*****
	(0.026)	(0.431)	(0.055)
Observations	636,947	521,790	638,685

Regressions of book leverage, debt/EBITDA, or an indicator for high leverage (above 75th leverage or Debt/EBITDA) on control variables. 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 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.

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

Table 3 reports results for the baseline regressions comparing U.S. firms to those in other countries. The coefficients are statistically significant and suggest potentially important effects. The first coefficient (0.094) implies that an increase in executory contract intensity by one cross-industry standard deviation (0.072) corresponds to an increase of leverage in the U.S. of 0.007 (vs. average leverage of 0.228), or around 3 percentage points higher. The Debt-to-EBITDA coefficient in the second column (1.641) implies that a one-standard-deviation increase corresponds to an increase of

0.12, or about a 4% increase in the amount of debt.[28]

Robustness tests are in Table 4 below. Results are consistent across alternative normalizations, subsamples, and industry measure constructions, supporting the baseline findings. Specifications deviate from the baseline as follows. In row A, executory contracts are normalized by revenues instead of assets. In row B, the sample is restricted to firms in OECD member countries. In row C, Australia, Greece, Italy, and after 2019 also Israel, are included with the U.S. as countries where rejection is possible (cf. Table 7). In row D, the lease measure is based only on non-U.S. firms in Compustat-CapitalIQ. The purchase obligation measure is only available for firms that file 10-Ks with the SEC, making a non-US sample too small. For this reason we retain the full sample value for purchase obligations. In row E, only data from 2019 and onward is used to form the executory contracts measure (older data may be less precise, and there were changes in accounting rules for leases in 2018). In row F, the mean is used instead to form the industry measure (the measure has been winsorized first). In row G, only one component of executory contracts (purchase agreements) is used, and in row H, only the other component (leases).

Most of the robustness tests agree with the baseline results.[29] Overall, this suggests that operational obligations incurred through executory contracts reduce debt capacity when rejection is impossible or difficult, 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.

[28]Keep in mind that these are industry medians. For individual firms, much higher values are relatively frequent, and our regressions suggest correspondingly large differences in debt capacity across countries.

[29]The biggest deviation is the tests using a measure of executory contracts from non-U.S. firms – possibly this reflects the lack of foreign firms in Compustat and the corresponding lack of data on executory contracts. The measure of executory contracts is not significantly different for the non-U.S. sample but the cross-industry standard deviation is around four times as high, indicating that basing the measure on few observations creates noise.

Table 4: **Robustness test**

	(1) Leverage	(2) Debt/EBITDA	(3) High Lev.
Baseline	**0.094*****	**1.641*****	**0.228*****
	(0.026)	(0.431)	(0.055)
A. Revenue normalization	**0.186*****	**3.260*****	**0.480*****
	(0.036)	(0.545)	(0.072)
B. OECD subsample	**0.093*****	**1.812*****	**0.224*****
	(0.029)	(0.501)	(0.058)
C. Broad treatment group	**0.089****	**1.177**	**0.191****
	(0.031)	(0.596)	(0.072)
D. Non-U.S. lease measure	**0.190*****	**5.311*****	**0.592****
	(0.010)	(0.151)	(0.019)
E. Late sample measure	**0.099*****	**1.673*****	**0.256*****
	(0.028)	(0.414)	(0.056)
F. Mean industry measure	**0.038**	**0.890****	**0.117***
	(0.021)	(0.314)	(0.045)
G. Purchase agreements only	**0.074**	**3.738***	**0.403**
	(0.152)	(1.716)	(0.274)
H. Leases only	**0.233*****	**4.292*****	**0.497*****
	(0.072)	(0.941)	(0.131)

Robustness tests based on Table 3. Standard errors clustered by firm and by industry-year are reported in parentheses.

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

4.3. Empirical tests - leverage changes after Israel's reform in 2019

Until recently, the treatment of executory contracts during legal restructuring in Israel offered limited options. Prior to 2019, rejection was not generally allowed (Tadmor-

Levy, 2020). A new law, Insolvency and Economic Rehabilitation Law 5778-2018, in effect since 2019, codified a very 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 the debtor is allowed to decide whether to reject, assume, or assign the contract, subject to few conditions (Hahn and Kimhi, 2021). Counterparties of rejected contracts have an unsecured claim on the estate, similar to Chapter 11. 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 post-commencement credit, extending the maximum period of moratorium during restructuring proceedings and allowing the sale of secured assets when necessary to ensure a successful restructuring".[30] Of the changes to insolvency law, contract rejection is mentioned as particularly significant (Arzi et al., 2025), compared to other changes. For our tests, it is also relevant that other changes (e.g., to DIP financing) are unlikely to have an impact that varies with the amount of executory contracts in an industry (DIP financing needs typically reflect the depth of distress, and the anticipated length of the process). Furthermore, the DIP reform has apparently been less impactful: according to a recent report from Kirkland & Ellis, the new rules for DIP financing have not been used (Gissin and Hershkovitz, 2026).

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 operating 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

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

regression equation is:

$$d_{it} = \theta X_{it} + \gamma E_j I_{ct}^{treated} + \mu F_i + \lambda G_{j\times t} + \eta H_{c\times t} + \epsilon_{it} \tag{15}$$

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 industry-year. 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 little difference to the coefficient estimates of interest).

Table 5: **Leverage of Israeli firms around the 2019 Reform**

	(1)	(2)	(3)	(4)
	Leverage	Debt/EBITDA	High Lev.	Log(Debt)
Executory contr. / Assets	**0.667*****	**3.866****	**1.191*****	**2.382*****
	(0.138)	(1.375)	(0.293)	(0.595)
Observations	508,929	420,235	509,514	460,515

This table shows regressions of leverage or debt or an indicator for high leverage (above 75th leverage or Debt/EBITDA) 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 four regressions are reported in Table 5. Coefficients are larger than in the U.S. tests in Table 3 for both leverage and debt-to-EBITDA, and are highly statistically significant across all four specifications. The coefficients imply that an increase in executory contract intensity by one standard deviation is associated with leverage that is higher by 5 percent of assets after the reform of insolvency law to permit executory contract rejection. This magnitude is somewhat larger than the

results comparing the U.S. to other countries.

These difference-in-difference estimates compare the period 2000-2018 to the period 2019-2022. 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 6 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 5, and 2019-2022 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.[31] The surprisingly rapid response is similar to that recorded by Rodano et al., 2016 for Italian bankruptcy reforms in 2005 and 2006.

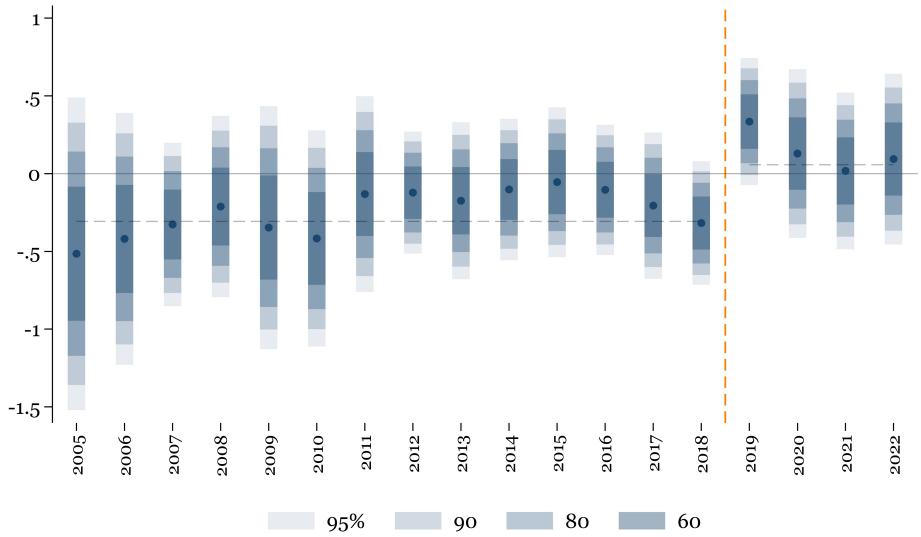
The Israeli figure shows two things. First, there is no trend before 2019 and an increase in leverage manifests rapidly following the reform. Second, 2020 and 2021 (perhaps affected by Covid) are not driving the difference between before and after (using only 2019 and 2022 gives similar results). Taken together, the regressions and the diagram 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 database. 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

[31] The post-reform period is characterized by a partial reversal. However, all four post-reform point estimates are above all the fourteen pre-reform point estimates. The law went into effect in September 2019: if we estimate the regression in Column (1) of Table 5 without 2019 data, the coefficient estimate is 0.790^{***}, not very different.

Figure 6: **Leverage effect of executory contract claims for Israeli firms**



This figure plots year-by-year coefficients from regressions of leverage on executory contracts by industry, normalized by assets, with controls as in Table 5 and errors clustered by firm and by industry-year. Confidence intervals are indicated. The key reform was implemented in 2019.

focus on the interaction of the industry measure of executory contract industries and an indicator for the U.S.

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

$$d_{jct} = \theta X_{jct} + \gamma E_j I_c^{treated} + \lambda G_{j\times t} + \eta H_{c\times t} + \epsilon_{jct} \tag{16}$$

where d is the (log of) value of new loans, teh (log of) number of new loans, or average new loan size; j is industry, t year, and c 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 industry, $I_c^{treated}$ indicates observations for U.S. firms, and where G and H are industry-

Table 6: **Lending volume by country and industry**

	(1)	(2)	(3)
Dep. variable	Loan value	Loan size	Loan value
Sample	All Countries	All Countries	OECD
Executory contr. / Assets	**3.757*****	**1.770*****	**3.285****
	(0.881)	(0.428)	(1.121)
Observations	8,010	8,010	4,343

Regressions of (log of) term loan origination (columns 1 and 3) or (log of) median loan size (column 2) on the interaction of an indicator for U.S. firms and the industry measure of executory contracts, and controls. The sample covers 2010–2023. Observations are industry-year-country cells. Column (3) restricts to OECD countries. All regressions include country-year and industry-year fixed effects. Standard errors clustered by country and industry are reported in parentheses.

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

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 2,913 loans (47 on average). We cluster standard errors by country and industry.[32] Results are reported in Table 6, where each coefficient represents one regression. The coefficients are positive and highly statistically significant. The magnitudes implied are large. For example, the first coefficient (3.757) implies a 31% higher lending volume in a U.S. industry for an increase in executory contract intensity by one standard deviation (0.072), compared to the same industry outside the U.S. This is a bigger magnitude than for overall debt levels, but it is worth noting than annual loan flows are quite volatile. Also, syndicated loans may be more sensitive to insolvency rules than other debt, since such loans are cash-flow based more often (Lian and Ma (2020)).

The evidence from the flow of new loans agrees with capital structure evidence: U.S. credit markets are more generous with credit to industries with high use of

[32] In our data, there are over 100 countries but many have very few observations and there may be heteroskedasticity across clusters. To address potential econometric issues with clustering, we implemented wild bootstrap of Cameron et al. (2008) for clustering on countries or industries; the coefficient of interest remains positive and statistically significantly different from zero.

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.[33]

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 obligations – 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 between the U.S. and the rest of the world, and on the changes to rejection rights embedded in the 2019 reform to Israeli insolvency law. We find consistent evidence suggesting that restructuring non-financial obligations increases firms' debt capacity. 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

[33] 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.

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. Recent reforms in Europe have been uneven in this regard - for example, the Italian reform from 2012 allows rejection but not assignment; the French Sauvegarde law from 2021 requires that rejection not be ”excessively detrimental” to the counterparty; whereas recent Dutch (2021) and Swedish (2022) rules appear more flexible.

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Appendix

A. List of variables in the theoretical model

d	expected value of debt
e	expected value of equity
D	face value of debt
C	cost of bankruptcy/restructuring
L	liquidation value of the owned assets
q	scale of the firm's owned assets
x	quantity of the input
c	the supplier's production cost per unit of the input
k	the supplier's opportunity cost per unit of the input
ψ	unit productivity of the input
p	unit price of the input
$P(i)$	effective unit price paid under restructuring regime i
θ	productivity of the owned assets
θ_L	liquidation threshold
θ_I	insolvency threshold
t	tax rate
F	financial restructuring possible
O	operational and financial restructuring possible
W	total surplus
Z	negative externality from liquidation

B. Equilibrium outcomes

Prices:

$$p^F = k + \frac{1}{2x}\left(q + x(\psi - k) - L - \sqrt{(q + x(\psi - k) - L)^2 - 4qx(c - k)}\right), \tag{B.1}$$

$$p^O = k + \frac{1}{2x}\left(C - \sqrt{C^2 - 4tqx(c - k)}\right). \tag{B.2}$$

Liquidation thresholds:

$$\begin{aligned}\theta_L^F &= \left(L + x\left(p^F - \psi\right)\right)/q,\\ \theta_L^O &= \left(L + x(k - \psi)\right)/q.\end{aligned}$$

Insolvency thresholds:

$$\begin{aligned}\theta_I^F &= 1 - \frac{C}{tq},\\ \theta_I^O &= 1 - \frac{C}{qt} + \frac{x\left(p^O - k\right)}{qt}.\end{aligned}$$

Face values of debt:

$$\begin{aligned}D^F &= q + x\left(\psi - p^F\right) - C/t,\\ D^O &= q + x\left(\psi - p^O\right) - C/t + x\left(p^O - k\right)/t.\end{aligned}$$

Expected values of equity:

$$\begin{aligned}e^F &= (1-t)\int_{\theta_I^F}^1 \left(q\theta + x\left(\psi - p^F\right) - D^F\right) d\theta\\ &= \frac{1-t}{2q}\left[\left(q\theta + x\left(\psi - p^F\right) - D^F\right)^2\right]_{\theta_I^F}^1\\ &= \frac{1-t}{2qt^2}C^2,\end{aligned}$$

$$
\begin{aligned}
e^O &= (1-t)\int_{\theta_I^O}^{1}\left(q\theta + x\left(\psi - p^O\right) - D^O\right)d\theta \\
&= \frac{1-t}{2q}\left[\left(q\theta + x\left(\psi - p^O\right) - D^O\right)^2\right]_{\theta_I^O}^{1} \\
&= \frac{1-t}{2qt^2}\left(C - x\left(p^O - k\right)\right)^2.
\end{aligned}
$$

Expected values of debt:

$$
\begin{aligned}
d^F &= (L-C)\int_0^{\theta_L^F} d\theta + \int_{\theta_L^F}^{\theta_I^F}\left(q\theta + x\left(\psi - p^F\right) - C\right)d\theta + D^F\int_{\theta_I^F}^{1} d\theta \\
&= (L-C)\,\theta_L^F + \frac{1}{2q}\left[\left(q\theta + x\left(\psi - p^F\right) - C\right)^2\right]_{\theta_L^F}^{\theta_I^F} + D^F\left(1-\theta_I^F\right) \\
&= (L-C)\,\frac{L + C - 2x\left(\psi - p^F\right)}{2q} + \frac{\left(D^F - C\right)^2}{2q} + D^F\frac{C}{tq} \\
&= \frac{1}{2q}\left(L^2 - C^2 - 2\left(L-C\right)x\left(\psi - p^F\right) + \left(D^F\right)^2 - 2D^F C + C^2 + 2D^F\frac{C}{t}\right) \\
&= \frac{1}{2q}\left(L^2 - 2\left(L-C\right)x\left(\psi - p^F\right) + \left(q + x\left(\psi - p^F\right) - C/t\right)\left(q + x\left(\psi - p^F\right) + C/t - 2C\right)\right) \\
&= \frac{1}{2q}\left(\left(L - x\left(\psi - p^F\right)\right)^2 - C^2/t^2 + 2tC^2/t^2\right) - C + \frac{q + 2x\left(\psi - p^F\right)}{2} \\
&= \frac{\left(L + x\left(p^F - \psi\right)\right)^2}{2q} - C - \frac{C^2\left(1-2t\right)}{2qt^2} + \frac{q + 2x\left(\psi - p^F\right)}{2},
\end{aligned}
$$

$$
\begin{aligned}
d^O &= (L-C)\int_0^{\theta_L^O} d\theta + \int_{\theta_L^O}^{\theta_I^O} \left(q\theta + x\left(\psi-k\right)-C\right) d\theta + D^O \int_{\theta_I^O}^{1} d\theta \\
&= L\frac{L-2x\left(\psi-k\right)}{2q} + \frac{1}{2q}\left(\left(q\theta_I^O\right)^2 + 2q\theta_I^O x\left(\psi-k\right) + x^2\left(\psi-k\right)^2\right) + D^O\left(1-\theta_I^O\right) - C\theta_I^O \\
&= \frac{L^2-2Lx\left(\psi-k\right)+x^2\left(\psi-k\right)^2}{2q} + \theta_I^O\frac{q^2\theta_I^O+2qx\left(\psi-k\right)-2qD^O-2qC}{2q} + D^O \\
&= \frac{\left(L-x\left(\psi-k\right)\right)^2}{2q} + D^O \\
&\quad +\theta_I^O\frac{qt+x\left(p^O-k\right)-C+2xt\left(\psi-k\right)-2qt-2xt\left(\psi-p^O\right)+2C-2x\left(p^O-k\right)-2Ct}{2t} \\
&= \frac{\left(L-x\left(\psi-k\right)\right)^2}{2q} + \left(1-2t\right)\theta_I^O\frac{-qt-x\left(p^O-k\right)+C}{2t} - tq\theta_I^O + D^O \\
&= \frac{\left(L-x\left(\psi-k\right)\right)^2}{2q} + \left(1-2t\right)\frac{\left(qt+x\left(p^O-k\right)-C\right)\left(-qt-x\left(p^O-k\right)+C\right)}{2qt^2} - tq\theta_I^O + D^O \\
&= \frac{\left(L-x\left(\psi-k\right)\right)^2}{2q} - \left(1-2t\right)\frac{\left(qt+x\left(p^O-k\right)-C\right)^2}{2qt^2} \\
&\quad +\frac{qt-qt^2+x\left(\psi-k\right)-tx\left(\psi-k\right)-C+tC+x\left(p^O-\psi\right)-tx\left(p^O-\psi\right)-tx\left(p^O-\psi\right)}{t} \\
&= \frac{\left(L-x\left(\psi-k\right)\right)^2}{2q} - \left(1-2t\right)\frac{\left(qt+x\left(p^O-k\right)-C\right)^2}{2qt^2} + \frac{\left(1-t\right)\left(qt+x\left(p^O-k\right)-C\right)}{t} \\
&\quad +x\left(\psi-p^O\right).
\end{aligned}
$$

C. Assumptions and proofs

Assumptions

In the theoretical model, we make the following four assumptions:

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

$$x(\psi - k) \leq C, \tag{A2}$$

$$3q(c - k)/2 \leq (q - L)(\psi - k), \tag{A3}$$

$$4qxt\,(c - k) < C^2. \tag{A4}$$

Assumption A1 bounds the bankruptcy cost from above relative to the tax benefit of debt. Together with Assumption A3, it guarantees that under both regimes there is a range of realizations of θ for which the bankruptcy court prefers to restructure rather than liquidate the insolvent firm. Assumption A2, together with $L > C$, implies that the firm is liquidated for sufficiently low realizations of θ under both regimes. Assumptions A3 and A4 imply that there are prices such that the supplier makes positive expected profits under financial and operational restructuring, respectively. The factor $3/2$ in A3 is not necessary for our main results, but it makes sure the firm prefers signing the contract to forgoing the input (Remark C.1).

Lemma C.1 *The equilibrium prices p^F and p^O are real valued, $k < p^F < \psi$ and $k < p^O$.*

Proof. The statements for p^O follow trivially from Equation (B.2) and Assumption A4. To show the statements for p^F, let $\hat{m} := q(c - k)/(q - L)$, which is positive by A1 and $c > k$. Write the break-even condition (10) in terms of $m := p - k$ using the convex function:

$$Q(m) := xm^2 - \big(q - L + x(\psi - k)\big)m + q(c - k) = 0.$$

Since $(q - L)\hat{m} = q(c - k)$, Assumption A3 implies $Q(\hat{m}) = x\hat{m}\big(\hat{m} - (\psi - k)\big) < 0$, while $Q(0) = q(c - k) > 0$. Because Q is convex, it has two distinct real roots, and the smaller one, $p^F - k$, lies in $(0, \hat{m})$. Hence $k < p^F < k + \hat{m} < \psi$. ■

Proposition C.1 *Under bankruptcy regime $i \in \{F, O\}$, a subgame-perfect equilibrium in pure strategies exists, and every such equilibrium has the outcome:*

$$\big\{p^i,\ D^i = q + x(\psi - p^i) - C/t + x(p^i - P(i))/t,\ \theta_L^i = \big(L + x(P(i) - \psi)\big)/q\big\}.$$

Proof. We solve the game by backward induction. Let $p \geq k$ be the lowest price offered, $\nu := x(\psi - p)$ the contract's net contribution to revenue when the firm pays in full, and $\rho_i := x(p - P(i)) \geq 0$ the reduction in contractual obligations in a restructuring (zero for $i = F$). The firm is insolvent if and only if $\theta < \theta_I(p, D) := (D - \nu)/q$. Note that $\nu + \rho_i = x(\psi - P(i)) \leq x(\psi - k) \leq C < L$ by Assumption A2 and Lemma C.1, and $C < t(q - L) < qt$ by Assumption A1.

Period 3: the bankruptcy court. The creditors of an insolvent firm receive $q\theta + \nu + \rho_i - C$ in a restructuring and $L - C$ in a liquidation. The court therefore liquidates if and only if the firm is insolvent and $\theta < \ell_i := (L - \nu - \rho_i)/q$, where $\ell_i \geq (L - C)/q > 0$:

$$\theta_L^i(p, D) = \max\big\{\min\{\ell_i,\, \theta_I(p, D)\},\, 0\big\}. \tag{C.1}$$

It restructures for some insolvent realizations if and only if $D > L_i := L - \rho_i$.

Period 2: the firm. Let $f^i(D)$ denote firm value given p and (C.1). For $D \leq \nu$, debt is riskless and $f^{i\prime} = t$. For $D \geq q + \nu$, the firm defaults at every realization θ and f^i is constant. In between these thresholds, differentiating $d^i + e^i$ gives:

$$f^{i\prime}(D) = t\big(1 - \theta_I(p, D)\big) - \frac{\Lambda_i(D)}{q}, \qquad \Lambda_i(D) := \begin{cases} C - \rho_i, & D > L_i, \\ D - (L - C), & D \leq L_i, \end{cases} \tag{C.2}$$

where Λ_i is the loss caused by the marginal default. Since Λ_i is continuous, nondecreasing and bounded above by $C < qt$, $f^{i\prime}$ is strictly decreasing on $(\nu, q + \nu)$ and positive just above ν. Moreover, $f^{i\prime}$ is the upper envelope of two decreasing linear functions that intersect at L_i, so its root, if any, is the larger of their two roots. If $f^{i\prime}$ has no root below $q + \nu$, the firm defaults at every realization and every $D \geq \max\{q + \nu, 0\}$ is optimal.

Under O, the root of the restructuring branch exceeds L_O, because $t\big(q - L + x(\psi - k)\big) - C + x(p - k) > 0$ by Assumption A1. Hence, imposing $D \geq 0$:

$$D^O(p) = \max\Big\{q + x(\psi - p) + \min\Big\{\frac{x(p - k) - C}{t},\, 0\Big\},\, 0\Big\}, \tag{C.3}$$

where the inner minimum selects $D = q + \nu$ when the firm defaults at every realization, which happens if $x(p - k) \geq C$. Under F, the root lies on the restructuring branch if and only if $f^{F\prime}(L) \geq 0$, that is, $t(q - L + \nu) \geq C$, and otherwise on the liquidation branch. Hence:

$$D^F(p) = \max\Big\{q + x(\psi - p) - \frac{C}{t},\, \frac{L - C + t\big(q + x(\psi - p)\big)}{1 + t},\, 0\Big\}. \tag{C.4}$$

As $D \uparrow q+\nu$, $f^{F\prime}$ tends to $-\Lambda_F(q+\nu)/q$, so the firm defaults at every realization if and only if $q+\nu \leq L-C$. The second term in (C.4) is then at least $q+\nu$ and therefore optimal. By Assumption A1, the first term is the largest whenever $p \leq \psi$.

Period 1: the suppliers. A supplier that signs a contract at price p is paid p per unit when the firm pays in full and recovers k otherwise. Under F it is paid in full unless the firm is liquidated, and under O only if the firm is solvent. Its expected profit per unit can be written:

$$\pi^i(p) = (p-k)\big(1-\bar{\theta}^i(p)\big) - (c-k),$$

where $\bar{\theta}^F(p) := \min\{\theta_L^F(p, D^F(p)), 1\}$ and $\bar{\theta}^O(p) := \min\{\theta_I(p, D^O(p)), 1\}$. By (C.1), (C.3) and (C.4), π^i is continuous. On $[k, \psi]$ under F and on $[k, k+C/x)$ under O:

$$\pi^F(p) = \frac{(p-k)\big(q-L+x(\psi-p)\big)}{q} - (c-k), \qquad \pi^O(p) = \frac{(p-k)\big(C-x(p-k)\big)}{qt} - (c-k).$$

Note that the first interval contains p^F by Lemma C.1 and the second p^O by (B.2). Setting these functions to zero gives (10) and (11). Each is a strictly concave function, quadratic in p with two distinct roots, by the proof of Lemma C.1 and by Assumption A4. Moreover, p^i is the smaller root. Since $\pi^i(k) = -(c-k) < 0$, it follows that $\pi^i < 0$ on $[k, p^i)$ and $\pi^i > 0$ on an interval immediately above p^i.

Existence. Let every supplier offer p^i, and let the firm and the court play (C.3) or (C.4) and (C.1). Every supplier earns zero. Raising the price makes the supplier lose the contract, and lowering it to $p \in [k, p^i)$ earns $x\pi^i(p) < 0$. The profile is therefore a subgame-perfect equilibrium, and evaluating the continuation strategies at p^i gives the stated outcome.

Uniqueness. The supplier's expected profit does not depend on which optimal continuation strategies are played. The court is indifferent only at $\theta = \ell_i$, which has probability zero, and the firm has several optimal face values only if it defaults at every realization. The supplier is then never paid in full: under O because the firm is never solvent and under F because $q+\nu \leq L-C$ implies $\ell_F > 1$, so the firm is always liquidated.

Let p^* be the price at which the contract is signed in a pure-strategy subgame-perfect equilibrium. The winning supplier could earn zero by raising its price, so $\pi^i(p^*) \geq 0$ and hence $p^* \geq p^i$. Suppose that $p^* > p^i$. Since there are at least two suppliers, one of them wins with probability at most one half and earns at most $x\pi^i(p^*)/2$. By offering some $p' < p^*$ it wins with certainty and earns $x\pi^i(p')$. If $\pi^i(p^*) > 0$, this exceeds $x\pi^i(p^*)/2$ for p' close to p^*. If $\pi^i(p^*) = 0$, it is positive for p' close to p^i. Either way the deviation is profitable, a contradiction. Hence $p^* = p^i$, and the face value of debt and the liquidation threshold on the equilibrium path

follow uniquely from the continuation strategies. ■

Remark C.1 *The firm prefers signing the equilibrium contract to forgoing the input.*

Proof. For $i \in \{F, O\}$, let $f^i := d^i + e^i$ denote equilibrium firm value, and let f^N denote the equilibrium value of the same firm without the contract. Define $a := x(\psi - k)$, $u_i := x(p^i - k)$, and $\nu := x(\psi - p^F) = a - u_F$.

Without the contract, $x = 0$, so there is nothing to reject and the two regimes coincide. Since $q - C/t > L$ by Assumption A1, the marginal default ends in a restructuring, and (8) gives $D^N = q - C/t$, $\theta_I^N = 1 - C/(qt)$ and $\theta_L^N = L/q$.

Substituting the equilibrium values in the expressions for firm value in the three settings gives:

$$
\begin{aligned}
f^N &= \frac{q}{2} - C + \frac{L^2}{2q} + \frac{C^2}{2qt}, \\
f^F &= \frac{q}{2} - C + \nu + \frac{(L-\nu)^2}{2q} + \frac{C^2}{2qt}, \\
f^O &= \frac{q}{2} - C + a + \frac{(L-a)^2}{2q} + \frac{(C-u_O)^2}{2qt}.
\end{aligned}
$$

Hence, the incremental firm value under F is:

$$
f^F - f^N = \frac{\nu\big(2(q-L)+\nu\big)}{2q} > 0,
$$

because $\nu > 0$ by Lemma C.1 and $q > L$ by Assumption A1. Similarly, under O the additional firm value is:

$$
f^O - f^N = \frac{a\big(2(q-L)+a\big)}{2q} + \frac{(C-u_O)^2 - C^2}{2qt}.
$$

Multiplying the break-even condition (11) by x and substituting $1 - \theta_I^O = (C - u_O)/(qt)$ gives $u_O(C - u_O) = qtx(c - k)$. Since $(C - u_O)^2 - C^2 = -2u_O(C - u_O) - u_O^2$, it follows that:

$$
f^O - f^N = \frac{a\big(2(q-L)+a\big)}{2q} - x(c-k) - \frac{u_O^2}{2qt}.
$$

By (B.2), $u_O \le C/2$, so $u_O^2 \le u_O(C - u_O) = qtx(c - k)$. Hence, by Assumption A3:

$$
f^O - f^N > x\Big[\frac{(\psi-k)(q-L)}{q} - \frac{3}{2}(c-k)\Big] \ge 0.
$$

■

Proof of Proposition 1. By Proposition C.1, the equilibrium thresholds are those listed in Appendix B. The differences between adjacent thresholds are:

$$\begin{aligned}
\theta_L^F - \theta_L^O &= \frac{x(p^F - k)}{q}, \\
\theta_I^F - \theta_L^F &= \frac{(q - L - C/t) + x(\psi - p^F)}{q}, \\
\theta_I^O - \theta_I^F &= \frac{x(p^O - k)}{qt}.
\end{aligned}$$

The first and third are positive because $p^F > k$ and $p^O > k$ by Lemma C.1. The second is positive because $q - L - C/t > 0$ by Assumption A1 and $p^F < \psi$ by Lemma C.1. This establishes the ordering. For the end points, Assumption A2 and $L > C$ give

$$\theta_L^O = \frac{L - x(\psi - k)}{q} \geq \frac{L - C}{q} > 0,$$

and (B.2) gives

$$1 - \theta_I^O = \frac{C - x(p^O - k)}{qt} = \frac{C + \sqrt{C^2 - 4qtx(c - k)}}{2qt} > 0.$$

Since θ_L^O is the smallest and θ_I^O the largest of the four thresholds, all four lie in the open unit interval. ■

Corollary C.1 *The input price is higher with operational than financial restructuring:* $p^O > p^F$.

Proof. By definition, p^F satisfies the break-even condition (10) and p^O satisfies (11), with each threshold evaluated at the corresponding equilibrium price. Both conditions can be written as $(p - k)(1 - \theta) = c - k$. Since $\theta_L^F < 1$ and $\theta_I^O < 1$ by Proposition 1,

$$p^F - k = \frac{c - k}{1 - \theta_L^F} \qquad \text{and} \qquad p^O - k = \frac{c - k}{1 - \theta_I^O}.$$

Subtracting the first from the second gives:

$$p^O - p^F = \frac{(c - k)\left(\theta_I^O - \theta_L^F\right)}{\left(1 - \theta_I^O\right)\left(1 - \theta_L^F\right)},$$

which is positive because $c > k$, by assumption, and $\theta_I^O > \theta_L^F$, by Proposition 1. ■

Lemma C.2 *The following holds for the face value of debt in the two bankruptcy regimes:*

i. $D^F < D^O$,

ii. $\frac{\partial D^F}{\partial x} < \frac{\partial D^O}{\partial x}$.

Proof. As in the proof of Remark C.1, for $i \in \{F, O\}$ let $u_i := x(p^i - k)$, which is positive by Lemma C.1. By Proposition C.1:

$$D^O - D^F = u_F + \frac{1-t}{t} u_O.$$

Part i: Both terms are positive since $t \in (0, 1)$.

Part ii: Let $M := q - L + x(\psi - k)$. Substituting and multiplying the break-even conditions (10) and (11) by xq and xqt, respectively, gives:

$$u_F (M - u_F) = qx(c-k) \qquad \text{and} \qquad u_O (C - u_O) = qtx(c-k).$$

Implicit differentiation yields:

$$\frac{\partial u_F}{\partial x} = \frac{q(c-k) - (\psi - k)u_F}{M - 2u_F} \qquad \text{and} \qquad \frac{\partial u_O}{\partial x} = \frac{qt(c-k)}{C - 2u_O}.$$

Both denominators are positive: $M - 2u_F = \sqrt{M^2 - 4qx(c-k)} > 0$ because the break-even quadratic has two distinct roots (proof of Lemma C.1), and $C - 2u_O = \sqrt{C^2 - 4qtx(c-k)} > 0$. For the first numerator, the break-even condition gives $q(c-k) = (p^F - k)(M - u_F)$, so:

$$q(c-k) - (\psi - k)u_F = (p^F - k)\big(q - L - u_F\big).$$

This is positive since $u_F < x(\psi - k) \leq C < t(q - L) < q - L$ by Lemma C.1 and Assumptions A2 and A1. Hence:

$$\frac{\partial\big(D^O - D^F\big)}{\partial x} = \frac{\partial u_F}{\partial x} + \frac{1-t}{t}\frac{\partial u_O}{\partial x} > 0.$$

■

Lemma C.3 *The following holds for the value of equity in the two bankruptcy regimes:*

i. $0 < e^O < e^F$,

ii. $\frac{\partial e^O}{\partial x} < \frac{\partial e^F}{\partial x} = 0$.

Proof. Part i: Since $t < 1$, $e^F = (1-t)C^2/(2qt^2) > 0$. Substituting for the equilibrium price p^O in e^O and thereafter computing the ratio of e^O to e^F gives:

$$\begin{aligned} e^O/e^F &= \frac{1}{4}\left(C + \sqrt{C^2 - 4qxt\,(c-k)}\right)^2/C^2 \\ &= \frac{1}{4}\left(1 + \sqrt{1 - 4qxt\,(c-k)\,/C^2}\right)^2. \end{aligned}$$

The last expression is strictly smaller than one since the square root is real and positive by Assumption A4 and less than one by $c > k$.

Part ii: Substituting for the equilibrium price p^O in e^O and differentiating gives:

$$\frac{\partial e^O}{\partial x} = -\frac{1-t}{2t}\frac{(c-k)\left(C + \sqrt{C^2 - 4qxt\,(c-k)}\right)}{\sqrt{C^2 - 4qxt\,(c-k)}} < 0.$$

From the expression for e^F immediately follows that it is independent of x. ■

Proof of Proposition 2. As in the proof of Lemma C.2, let $u_i := x(p^i - k)$ for $i \in \{F, O\}$ and $M := q - L + x(\psi - k)$, and recall that $\partial u_F/\partial x > 0$ and $\partial u_O/\partial x > 0$. By Lemma C.3, $0 < e^O < e^F$ and $\partial e^F/\partial x = 0$. Differentiating the expressions in Appendix B gives

$$\frac{\partial d^F}{\partial x} = \left(\psi - k - \frac{\partial u_F}{\partial x}\right)(1 - \theta_L^F), \qquad \frac{\partial d^O}{\partial x} = \frac{(\psi - k)M}{q} + (1-2t)K, \qquad \frac{\partial e^O}{\partial x} = -(1-t)K,$$

where $K := (C - u_O)\,(\partial u_O/\partial x)/(qt^2) > 0$ and $1 - \theta_L^F = (M - u_F)/q$.

Part ii: Since $\partial u_F/\partial x > 0$ and $0 < 1 - \theta_L^F < M/q$, we have $\partial d^F/\partial x < (\psi - k)M/q$, whatever the sign of $\partial d^F/\partial x$. Hence:

$$\frac{\partial (d^F/e^F)}{\partial x} = \frac{1}{e^F}\frac{\partial d^F}{\partial x} < \frac{(\psi - k)M}{qe^F}.$$

Under operational restructuring:

$$\frac{\partial (d^O/e^O)}{\partial x} = \frac{(\psi - k)M}{qe^O} + \left(1 - 2t + (1-t)\frac{d^O}{e^O}\right)\frac{K}{e^O}.$$

The term in parentheses exceeds one. Creditors receive at least $L - C > 0$ when the firm is insolvent and D^O when it is solvent, so $d^O > D^O(1 - \theta_I^O) = D^O(C - u_O)/(qt)$. Moreover, $D^O - L = (q - L - C/t) + x(\psi - k) + (1-t)u_O/t > 0$ by Assumption A1, so $D^O > L > C > C - u_O$.

It follows that:

$$(1-t)\frac{d^O}{e^O} = \frac{2qt^2 d^O}{(C-u_O)^2} > \frac{2tD^O}{C-u_O} > 2t.$$

Combining, and using $e^O < e^F$ by Lemma C.3:

$$\frac{\partial(d^O/e^O)}{\partial x} > \frac{(\psi-k)M}{qe^O} > \frac{(\psi-k)M}{qe^F} > \frac{\partial(d^F/e^F)}{\partial x}.$$

Part i: Assumptions A3 and A1 do not involve x, and Assumptions A2 and A4 bound it from above, so if x is admissible, then so is every contract size in $(0, x]$. As $x \downarrow 0$, u_F and u_O tend to zero and the equilibrium values under both regimes converge to those of a firm without the contract, so $d^O/e^O - d^F/e^F \to 0$. By part ii, this difference is strictly increasing in x, and it is therefore positive. ■

D. Treatment of Executory Contracts in insolvency - overview

Table 7 summarizes the treatment of executory contracts in the law of several countries, based on Chuah and Vaccari, eds (2023). 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. We ignore whether assignment is possible (due to lack of detailed information about this). **Ipso Facto** refers to whether some contract 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 7: **Executory Contract Treatment (2021)**

Country	Restructuring	Unilateral rejection	Ipso Facto	Withhold perfor-mance	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	No	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

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

Following the instructions in Moon and Phillips (2021), 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 businesses, 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.[34]

While most firms disclose their purchase obligations in the required tabular format in Item 7, "MD&A", as shown in Figure 7 and 8, 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 (2021) are combinations of "purchase" and one of the following words: "obligation", "commitment", "agreement",

[34]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 7: **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 8: **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

"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, 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.[35] 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 7), others aggregate their future obligations over multiple years (e.g., Figure 8). Finally, when multiple items extracted 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.

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

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