Credit default swaps around the world: Investment and financing effects

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Abstract

We analyze the impact of credit default swaps (CDS) introduction on real decision-making within the firm, taking into account differences in the local economic and legal environment of firms. We extend the model of Bolton and Oehmke (2011) in order to consider uncertainty regarding whether the actions taken by the reference entity will trigger credit events for the CDS obligations. We test the predictions of the model in a sample of more than 56,000 firms across 50 countries over the period 2001-2015. We find substantial evidence that the introduction of CDS affects real decisions within the firm, including leverage, investment, and the risk of investments taken by the firm. Importantly, we find that the legal and market environment in which the reference entity operates has an influence on the impact of CDS. The effect of CDS is larger where uncertainty regarding their obligations is reduced, and where they mitigate weak property rights. Our results shed light on the incomplete nature of CDS contracts in international capital markets, related to significant legal uncertainty surrounding the interpretation of underlying credit events.

Keywords: Credit Default Swaps, CDS, investment policy, financing policy, creditor rights, property rights, private credit, ownership concentration
JEL Classification: G3, F4, F3

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Abstract

We analyze the impact of credit default swaps (CDS) introduction on real decision-making within the firm, taking into account differences in the local economic and legal environment of firms. We extend the model of Bolton and Oehmke (2011) in order to consider uncertainty regarding whether the actions taken by the reference entity will trigger credit events for the CDS obligations. We test the predictions of the model in a sample of more than 56,000 firms across 50 countries over the period 2001-2015. We find substantial evidence that the introduction of CDS affects real decisions within the firm, including leverage, investment, and the risk of investments taken by the firm. Importantly, we find that the legal and market environment in which the reference entity operates has an influence on the impact of CDS. The effect of CDS is larger where uncertainty regarding their obligations is reduced, and where they mitigate weak property rights. Our results shed light on the incomplete nature of CDS contracts in international capital markets, related to significant legal uncertainty surrounding the interpretation of underlying credit events.

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I. Introduction

Single-name corporate credit default swaps (CDS) are an important instrument for the transfer of credit risk. Researchers have argued that in addition to providing a vehicle for third party hedging, this derivative asset can have substantial consequences for corporate financial decisions due to its feedback effect on the payoffs of stakeholders in the underlying entities. For example, the existence of CDS may affect the financing structure of firms by influencing the monitoring intensity of lenders (Morrison (2005)), by creating an empty creditor problem (Hu and Black (2008a,b), Bolton and Oehmke (2011)), and by affecting investors' incentives to hold synthetic debt, rather than primary debt, particularly during economic expansions (Oehmke and Zawadowski (2015), Campello and Matta (2013)). Bolton and Oehmke (2015) suggest that the introduction of CDS on underlying firms can have significant effects on creditors' ability to enforce their claim or affect their priority in bankruptcy; these effects may result in changes in the firms' bankruptcy risk. All of these implications can result in changes in firms' funding costs and financing structure.[1] In addition, other authors have modeled the effect of CDS on liquidity policies and real investment, through effects on monitoring by creditors and risk sharing (see, e.g., Parlour and Winton (2013) and Subrahmanyam, Tang and Wang (2017)).

There is little consensus in this literature regarding the net impact of CDS on the underlying firms. It is clear that CDS can provide better hedging opportunities for lenders, but these opportunities may be associated with inefficiencies such as excessive liquidation, reduced monitoring by lenders and increased losses to creditors in default. However, by increasing creditor rights, CDS may also be associated with higher leverage, greater levels of investment and less frequent strategic default. Importantly, all of these effects are related to the legal and market framework in which the underlying entity operates. This framework includes bankruptcy codes, contract enforcement, corporate governance mechanisms, and the relative importance of public and private markets.

We extend the model in Bolton and Oehmke (2011) to allow for uncertainty regarding whether an action taken by the firm triggers a credit event for CDS held on the debt of the firm. This uncertainty captures differences in how local bankruptcy codes interact with the International

[1] See e.g. Ashcraft and Santos (2009), Saretto and Tookes (2013) and Subrahmanyam, Tang, and Wang (2014), among others, for empirical justification.

Swaps and Derivatives Association (ISDA)'s standardized definitions of CDS contract terms. If there is less uncertainty that a particular action triggers payments related to CDS, the environment is considered more creditor-friendly. For plausible parameter values, we demonstrate that the introduction of CDS increases debt capacity more in regimes with less uncertainty regarding credit events, as well as in environments with lower liquidation cost, weaker contract enforceability and greater concentrations of shareholder ownership. The intuition is similar to that in Bolton and Oehmke (2011): well-functioning credit derivative contracts, such as CDS, can allow firms to overcome limited commitment problems that arise due to weak institutional heritages. However, these benefits are larger when there is less uncertainty about the enforcement of obligations due under the CDS contract.

The results from our model highlight that the real effects of CDS on reference entities depend crucially on features of the local legal environment. Although CDS contracts are largely standardized by ISDA, corporate bankruptcy laws and other elements of institutional structure vary substantially across countries, affecting contractual efficacy.[2] The empirical work in this area has primarily examined these effects in the context of the legal and financial environment in North America. In sharp contrast, we examine whether cross-country differences in institutional structures, particularly with regard to the legal code governing the firm, influence the impact of the introduction of CDS trading on underlying corporate financial and investment policies.

Using a sample of more than 56,000 firms from 50 countries during the period from 2001-2015, we analyze the extent to which the strength of creditor rights, the degree of contract enforceability, the importance of private credit availability in the development of a country's financial markets, and the degree of shareholders' ownership concentration affect the propensity to introduce CDS on underlying firms and their resulting financing choices, risk, and investment strategies. To our knowledge, this research is the first to analyze the consequences of CDS trading for non-financial firms in a global context, and therefore, provides the first detailed, large-scale, out-of-sample evidence for the effect of CDS on corporate financial policies beyond prior U.S. studies.[3]

[2] Section III below provides more details on this discussion.

[3] In their survey of the CDS literature, Augustin, Subrahmanyam, Tang, and Wang (2015) state that "a broader use of CDS data in international finance settings seems significantly lacking." (p. 19).

An analysis of the effects of CDS introduction must, by necessity, consider endogeneity biases since CDS introduction is not random. These potential biases may be related to characteristics of firms, as well as key attributes of firms' home country. We address these concerns using a relatively new econometric technique. We first estimate the market's propensity to introduce CDS on firms, using an extensive array of firm and country characteristics. We then use the resulting propensity scores as a weighting mechanism for the sample in our analysis. This novel "overlap weighting" approach developed in Li, Morgan and Zaslavsky (2017) generates similar distributions of all firm- and country level covariates across CDS and non-CDS firms and allows us to make causal inferences on the effects of CDS introduction on corporate financial and investment policies.

Our results indicate that CDS are more likely to be introduced on firms that are headquartered in countries with weaker creditor rights, a stronger orientation toward bank financing, and lower levels of ownership concentration. These results suggest that interest in CDS, and their ability to strengthen creditor rights (what Djankov, McLeish and Shleifer (2007) term the "power theory of credit") is higher in countries where creditor rights are weaker, where local lenders might particularly value the ability to hedge their exposure to borrowers, and where dispersed shareholders might be expected to do relatively little monitoring.

After CDS introductions, underlying firms increase leverage in countries that have stronger creditor rights along two dimensions. The first dimension is the requirement that creditor consent is necessary in order to enter reorganization, which can act as a trigger for CDS obligations. This result is consistent with the predictions of the model: creditors with CDS protection and control over entry into reorganization have substantially higher bargaining power, allowing the firm to overcome a limited commitment problem relating to the issuance of debt. The second dimension is the requirement that secured creditors are paid first out of liquidation proceeds. This is consistent with the model's prediction that leverage increases are higher where liquidation costs are low, particularly when excessive liquidation pressure can come from empty creditors with CDS protection.

We also find that underlying firms increase leverage more in countries with weaker contract enforceability and high levels of concentration in equity ownership. These results are also consistent with the model's implications. The introduction of CDS can act as a substitute for weak property rights, especially in situations where poor enforceability of property rights is a constraint on the supply of credit. This is consistent with the finding in Bae and Goyal (2009) that, along with creditor rights, property rights are an important determinant of the credit available to firms. In addition, new-

ly introduced CDS contracts effectively enhance the debt capacity of underlying reference entities when creditors initially have an inferior bargaining position with respect to shareholders who own the majority of shares (Davydenko and Strebulaev (2007)) and, as a consequence, would have more bargaining power during private debt renegotiation in the absence of CDS.

The interaction between the CDS contract design and local bankruptcy codes also influences the investment policies of firms. Specifically, in cases where there are creditor restrictions on firms' entering bankruptcy, the presence of CDS increases the level of capital investment of firms. These effects are mitigated when the domestic credit market is robust, and there is some weak evidence that the increase in investment is larger in countries where proxies for property rights are weaker. We also find strong evidence that the effect of CDS introductions on riskier investments, which we measure using the share of research and development (R&D) in total investment, differs markedly across legal environments. That is, we find that the introduction of CDS decreases the share of R&D in capital investment in countries with creditor restrictions on entering bankruptcy. This suggests that the introduction of CDS contracts may provide an incentive for firms to invest in tangible capital, similar to the credit multiplier effects in Almeida and Campello (2007). Interestingly, in countries where managers are not allowed administration of the company during bankruptcy, the introduction of CDS has a positive effect on the share of R&D in capital spending. We also find strong evidence that the introduction of CDS in countries with lower political risk and stronger domestic credit markets experience a larger increase in R&D share. This suggests that CDS contracts increase the appetite of local lenders to finance riskier or more innovative projects, but do not act as a vehicle for hedging political risk.

Finally, we examine the effect of CDS introduction on the volatility of equity returns in the reference entities. We find that idiosyncratic equity return volatility increases significantly where creditor restrictions on firms' ability to enter bankruptcy are in place. Given the increased propensity to invest in tangible capital in these circumstances, the increase in volatility seems unlikely to be the result of an increase in the underlying project risk. Instead, this could indicate that, where creditors influence firms' ability to seek protection from payment obligations and the presence of CDS contracts bolsters creditor rights, additional residual risk is borne by equity holders rather than creditors to the firm. This is consistent with the findings in Favara, Schroth, and Valta (2012), who document higher equity risk in the presence of strong creditors. These results suggest that when local bankruptcy codes do not conflict with the ISDA's contractual definition of the reference entity default,

CDS effectively reduce the threat of strategic default by shareholders and, as a consequence, equity risk increases following the introduction of CDS.

The paper is organized as follows. Section II summarizes the related literature, while Section III provides institutional details about CDS. Section IV derives an extension of the Bolton and Oehmke (2011) model and specifies the resulting empirical predictions. The empirical research design and data are discussed in Sections V and VI, respectively. Section VII presents the results, while Section VIII concludes.

II. Review of Related Literature

While financial derivatives have been around for more than three decades, CDS are a much more recent phenomenon. Given the role of CDS in the recent financial crisis, the focus of the existing literature has been primarily on the role of CDS with regards to financial institutions. Similarly, the European sovereign debt crisis has triggered interest in using CDS to study sovereign risk (see, e.g. Acharya, Drechsler, and Schnabl (2014) and Lee, Naranjo, and Sirmans (2015)). In contrast, while an extensive literature has investigated the use of derivatives on currencies, interest rates and commodity prices by nonfinancial firms and the underlying frictions that justify their existence (see, e.g., Bartram, Brown and Conrad (2011) and Bartram, Brown and Fehle (2009)), much less attention has been paid to the effect of CDS on these firms. Similar to equity derivatives, CDS are typically not held by the reference entity, i.e., nonfinancial firms are generally not CDS users. Rather, some of their claimholders, e.g., bondholders, may use CDS contracts for speculative or hedging purposes. Nevertheless, a developing, relatively recent literature suggests that CDS may still affect various corporate policies of the underlying firms.[4]

Although CDS are, in theory, redundant derivative assets, existing research indicates that market frictions are non-trivial and hence that the introduction of CDS can have significant effects on security prices, economic incentives and investor and firm behavior. These effects drive a wedge between the payoffs on the underlying asset (the firm's assets) and the payoff on the derivative instrument (the CDS contract). As discussed above, the mechanisms and directions of these effects differ across models. The existing empirical work provides evidence that U.S. firms with CDS have

[4] See Augustin, Subrahmanyam, Tang, and Wang (2015) for an exhaustive survey of the literature.

higher leverage ratios and longer debt maturity (Saretto and Tookes (2013)), and that the existence of CDS affects the cost of debt, with riskier firms experiencing an increase in spreads and safer firms experiencing a decline in spreads (Ashcraft and Santos (2009)). Subrahmanyam, Tang and Wang (2014) also report that, following CDS introduction, U.S. firms' credit ratings tend to decline and bankruptcy risk increases.

While the empirical evidence to date indicates that CDS contracts have significant effects on the financial decisions of firms, the reference entities in these papers are headquartered in North America and, as a result, are subject to similar legal environments. The results of our theoretical model indicate that the effects of CDS introduction on leverage should be larger in countries with creditor-friendly bankruptcy codes, weaker contract enforceability, and higher concentration of shareholder ownership. Consequently, in our empirical tests, we allow the impact of CDS introduction to differ with variation in the legal and market environment in which the underlying reference entity operates.

III. CDS and the Local Legal Environment

A single-name CDS contract specifies the underlying reference entity, the maturity of the contract, the ongoing payments that are required to be made by the protection buyer to the protection seller, the definition of the credit events that would trigger an obligation due from the protection seller to the protection buyer, the manner in which the payments from seller to buyer will be determined, and the manner in which the securities that may be physically delivered into the contract will be set. There are six trigger events of a CDS, namely bankruptcy, obligation acceleration, obligation default, failure to pay, repudiation/moratorium, and restructuring. Among them, the following three are principal credit events for corporate CDS: bankruptcy, failure to pay, and restructuring. When a trigger event occurs, CDS are settled through credit default auctions, where final recovery rates are determined through dealer bids, and the contract counterparties are settled accordingly either in cash or with the physical delivery of the underlying debt obligations.

CDS contracts are typically governed by rules established by ISDA, and make use of a standard set of clauses set out in the ISDA Master Agreement. Despite standard language, in the early days of CDS contracts, there were significant disagreements and litigation over contract terms, including whether credit events had actually occurred, and so whether obligations had been triggered. Over the last fifteen years, ISDA has instituted changes in their Master Agreement in order to min-

imize ambiguity, create a more homogeneous CDS product, reduce counterparty risk, and streamline the processes through which settlement payments are determined. The most significant changes were included in the "Big Bang Protocols" in 2009. In particular, these protocols set up regional Determination Committees (DC) to consider whether a credit event has occurred and to manage the auction process through which final CDS payments are settled, and created common look-back provisions for credit events to reduce basis risk for CDS traders. In addition, restructuring was excluded as a credit event for North American reference entities (but retained as a potential credit event in the rest of the world).

While these changes have created a more standardized CDS contract, the legal environment in which a reference entity operates is still important. Historically, Chapter 11 proceedings in the United States are the most common credit event trigger for CDS in the world, but reference entities that operate outside of the United States are subject to bankruptcy provisions that differ in the strength of creditor protections, including the grants of automatic stays, prohibitions on debt payments, preservation of legal rights, and the length and timing of the resolution process. For CDS contracts, these differences influence decisions on whether a credit event has occurred, and they can influence the timing of settlement auctions in cases where a credit event is deemed to have occurred. In Appendix A, we briefly discuss two recent cases in which consideration of specific elements of a country's bankruptcy code has played an important role in the performance of CDS. As these examples demonstrate, there can be significant legal issues to consider in the determination of contingent payoffs associated with CDS contracts. These issues motivate an analysis of how local bankruptcy provisions affect the underlying deliverable obligations in single name CDS contracts and, as a result, creditors in the firm. In the next section, we develop a model that takes into account the fact that there may be some uncertainty as to whether actions taken by the firm trigger payments due under the CDS contract.

IV. Insights and Empirical Predictions from a Structural CDS Model

A. Setup

We consider a model setting that is an extension of the one in Bolton and Oehmke (2011). A firm raises an amount, B, of debt today (time 0) by promising a fixed payment, F, at time 1. At time 1, the firm generates a cash flow, C_1: C_1 may be either C_1^H with probability θ or C_1^L with probability

$(1-\theta)$, where $C_1^L < C_1^H$ (H="High" and L="Low"). C_1^L is normalized to zero without loss of generality. Soon after time 1, the firm's continuation value, C_2 (either C_2^H with probability ϕ or C_2^L with probability $(1-\phi)$, where $C_2^L < C_2^H$), is known with certainty to the firm's shareholders. However, there is limited verifiability of the cash flow to creditors, i.e., they can verify only C_1^L, but cannot verify the magnitude of C_1^H at time 1. The continuation value of the firm, C_2, also cannot be verified by the firm's creditors without incurring costs. However, if verification costs are paid by shareholders, the exact state of the world at time 2 is observable for both the firm's insiders (i.e., shareholders) and its outside claimants (i.e., creditors). We set the risk-free discount rate to zero to keep the notation simple, without loss of generality.

At time 1, if the firm fails to pay F, the firm and its creditors start private debt renegotiation. During this *out-of-court* debt workout, creditors can either liquidate the firm (outright liquidation as in Chapter 7, or in-court restructuring as in Chapter 11 of the U.S. bankruptcy law) yielding the liquidation value S, or they can get $q\lambda C_2$ as a renegotiation surplus. In this surplus, the term λC_2 takes into account that only a fraction of the continuation value, C_2, is available due to the costs of private renegotiation; hence $\lambda<1$. λC_2 is, therefore, the *maximum* renegotiation surplus that accrues to both the firm and the creditors, taken together; q denotes the creditors' bargaining power relative to the firm (i.e., its shareholders), which reduces the value available to the latter. Based on the insight provided by Hart and Moore (1998), liquidation is typically costlier than renegotiation ($S < \lambda C_2^L$) due to the destruction of the firm's going-concern value in the event of liquidation and, hence, shareholders and creditors are motivated to avoid it.

When creditors, who also own CDS protection, reject a renegotiation offer from the firm's shareholders, they submit a request to the DC to verify whether a credit event was, in fact, triggered. As discussed in Appendix A, there is significant variation across country jurisdictions in terms of legal risk with regard to the recognition of credit events, due to differences in legal frameworks, and the resultant conflicting interpretations of the definition of the underlying credit event (see also Simmons & Simmons (2016)). Based on the anecdotal evidence presented in Appendix A, we assume that there is a probability ε that a credit event is not triggered. As a specific example of this, consider a case in which the firm could credibly claim that an in-court restructuring filing is volun-

tary, rather than related to a credit event; this possibility would reduce the bargaining power of creditors.[5]

Under these circumstances, creditors with CDS credit protection with a notional value of N maximize their expected payoff during the private debt workout with the firm. Their payoff is $max[q\lambda C_2^H, \gamma N]$ if $i = H$ at time 2, where $\gamma N = (1-\varepsilon)N + \varepsilon M$ with $M < N$, and $max[q\lambda C_2^L, N]$ if $i = L$. In each state, the first term in the square brackets denotes the payoff to CDS creditors if they agree with the firm on debt restructuring, whereas the second term in the square brackets denotes their payoff if they reject the offer from the shareholders and take their case to the DC. The parameter γ captures the legal uncertainty experienced by creditors about their payoff. Note that it reduces their payoff only in the *H*-state at time 2, in which the continuation value of the firm turns out to be high (i.e., sufficient to pay off creditors), and there is some probability ε that creditors cannot trigger CDS payments. Consequently, they receive a smaller payout, M, than the contracted notional of the CDS, N.[6] In contrast, when the realization at time 2 is in the *L*-state, there is no such ambiguity regarding the nature of the trigger event and the payoff is N.[7]

B. Effects of Country Characteristics

The key parameters in the above setting are λ, q, and γ. We now provide some color on the economic intuition behind them, and then derive comparative statics for the sensitivity of the change in debt capacity, as a consequence of introducing a CDS contract, to changes in these parameters. The interpretation of these parameters is as follows:

- Cash flow verifiability (λ).

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[5] See, for example, Bloomberg, "Noble Default-Swap Verdict in Play as Test of ISDA System," September 5, 2017; "Noble's Chairman Paul Brough said on Tuesday it expects to find a buyer for its oil business by the end of September and get an extension on its covenant waivers, […] Getting those things done would give the company room to settle a repayment plan with its banks and avoid default, Brough said."

[6] The value of M could vary depending on the assumed bargaining power of creditors following their failure to trigger CDS payments. For example, $M = q\lambda C_2^H$ if creditors are assumed to maintain the same bargaining power as they had in their initial round of debt negotiation with shareholders. Our results are robust as long as the bargaining power of creditors does not *increase* after their failure to trigger CDS payments, which seems plausible. We are grateful to Dmitry Chebotarev for raising this issue.

[7] Given the setup of the information asymmetry between the firm and creditors, creditors cannot distinguish the up-down path from the down-down path. All they can verify in the *L*-state at time 2 is that the firm's continuation value turns out to be low, but only after costly cash flow verification.

Debt workout is costly when property rights are poorly enforced (see, e.g., Bae and Goyal (2009) and Djankov, Hart, McLeish and Shleifer (2008)). Hence, poor contract enforcement lowers the recovery rate and also increases the time spent in repossessing collateral during the restructuring process. These costs are captured by 1-λ, which is proportionately deducted from the continuation value, C_2.

- Creditors' bargaining power during private debt renegotiation (q).
  The bargaining power of creditors during the private renegotiation process (which is negatively correlated with the fraction of equity owned by the firm's principal shareholders, e.g., CEO and institutional investors (Davydenko and Strebulaev (2007)) determines the share of the continuation value, C_2, available to creditors, with the balance going to shareholders. The greater the concentration of ownership, the weaker creditors' bargaining power during the debt renegotiation process.
- Trigger event uncertainty (γ).
  A creditor-friendly local bankruptcy code implies less uncertainty in the recognition of the CDS trigger event, and therefore, a greater expected CDS payout (i.e., a higher γ). For instance, when the local bankruptcy codes empower creditors to limit a firm's ability to file for an *in-court* restructuring that it claims is voluntary, the trigger event definition risk in CDS contracts is reduced.

C. Debt Pricing

Our framework is essentially an extended binomial model, based on Bolton and Oehmke (2011), which includes *ex post* trigger event uncertainty regarding the bankruptcy court's actions. By construction in our model, along the path where the first period cash flow is C_1^H and the continuation value turns out to be C_2^L, the so-called *up-down* path, there is the possibility of strategic default by shareholders in the first period. Specifically, shareholders can minimize the payment to creditors at time 1, $min\left[F,(1-\lambda)C_2^L+q\lambda C_2^L\right]$, by threatening liquidation without truthfully revealing the actual cash flow at time 1. The first term in the square brackets denotes the cost to shareholders if the firm truthfully reveals its time 1 cash flow (C_1^H) and pays F. The second term indicates the consequences of strategic default; in that case, shareholders' outlay is the sum of the verification cost of continuation value during private debt renegotiation ($(1-\lambda)C_2^L$)) and the portion of the renegotiation sur-

plus that shareholders give up to the benefit of creditors ($q\lambda C_2^L$). (Note that this formulation assumes that the verification costs are entirely paid out of the firm's resources.) If honoring the original contract is not costly ($F \le (1-\lambda)C_2^L + q\lambda C_2^L$), the firm does not attempt strategic default, else it does.

Given this incentive compatibility condition of the firm's shareholders, its debt capacity for a given F *without* CDS is:[8]

$$B = \begin{cases} \theta F + (1-\theta)\left[\phi q\lambda C_2^H + (1-\phi)\, q\lambda C_2^L\right] & \text{if } F \le F_C^L \\ \theta\left[\phi F + (1-\phi)\, q\lambda C_2^L\right] + (1-\theta)\left[\phi q\lambda C_2^H + (1-\phi)\, q\lambda C_2^L\right] & \text{if } F_C^L < F \le F_C^H \end{cases} \quad (1)$$

where the breakeven points for the debt F, F_C^L and F_C^H, in the *up* and *down* states for the continuation value, are given by $F_C^L = C_2^L\left[1-\lambda(1-q)\right]$ and $F_C^H = C_2^H\left[1-\lambda(1-q)\right]$, respectively.[9] Equation (1) presents the cash flows to the bondholders in two cases. If F is sufficiently low ($F \le F_C^L$), no strategic default occurs at the *up-down* node. When the debt burden becomes substantial ($F > F_C^L$), the firm finds it incentive-compatible to deviate from the original debt contract and attempts to privately renegotiate its debt. In such a case, creditors can receive only $q\lambda C_2^L$. Note that the possibility of strategic default limits the commitments that the firm can make.

In the presence of CDS, the payouts change. When creditors hold CDS contracts with a notional value of N, the payoff to the creditors in case of a credit event (π) is $\pi = \gamma N$ if $i = H$ at time 2, and $\pi = N$ if $i = L$. The firm honors the original debt contract without strategic default if *max* $\left[\lambda C_2 - \pi, 0\right] \le C_2 - F$. When $\pi > q\lambda C_2$, the creditors' payout is higher when debt workout occurs

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[8] To ensure that debt is not risk-free, we implicitly impose a lower bound for F, i.e. $\phi q\lambda C_2^H + (1-\phi)q\lambda C_2^L$, which would render the problem moot.

[9] If $F > F_C^H$, strategic default would always arise even in the *up-up* state in our binomial path, and the maximum pledgeable cash flow degenerates to $\phi q\lambda C_2^H + (1-\phi)q\lambda C_2^L$, which is less than the funding the firm would have achieved at $F = F_C^H$ in Equation (1). In our main analysis, we exclude this degenerate case and focus on the case $F \le F_C^H \equiv \overline{F}$ to avoid technical drawbacks that arise from our binomial representation of the states of the nature.

and, as a consequence, the workout proposal is not turned down by creditors. With these payouts, the firm's debt capacity is:

$$B_{CDS}=\begin{cases}\theta F+(1-\theta)\left[\phi max(\gamma N, q\lambda C_2^H)+(1-\phi)N\right] & \text{if } F\le \tilde{F}_C^L \\ \theta\left[\phi F+(1-\phi)N\right]+(1-\theta)\left[\phi max(\gamma N, q\lambda C_2^H)+(1-\phi)N\right] & \text{if } \tilde{F}_C^L < F\le \tilde{F}_C^H\end{cases} \quad (2)$$

where $\tilde{F}_C^L = C_2^L - max\left[\lambda C_2^L - N, 0\right]$ and $\tilde{F}_C^H = C_2^H - max\left[\lambda C_2^H - \gamma N, 0\right]$, respectively. These breakeven points are defined in a manner similar to the case without CDS. However, the existence of CDS contracts changes the alternative opportunities available to the creditors, since they may be able to obtain payment by triggering default and collecting on their CDS contracts. It should be noted that $\tilde{F}_C^L \ge F_C^L$ when $N > q\lambda C_2^L$ and $\tilde{F}_C^H \ge F_C^H$ when $\gamma N > q\lambda C_2^H$, i.e., the availability of CDS contracts with less legal uncertainty in CDS trigger events helps mitigate the firm's limited commitment problem by strengthening the creditors' bargaining power during private debt renegotiations.

What if the CDS notional becomes excessive, i.e., there is substantial over-insurance of credit risk by creditors, resulting in an empty creditor problem? For example, if $N > \lambda C_2^L$, debt renegotiation between the firm and CDS creditors fails in the *L*-state at time 2 (as a result of the empty creditor problem), and the debt payoff becomes the liquidation value, S ($< \lambda C_2^L$).[10] The firm's debt capacity with CDS in this case is:

$$B_{CDS}^{Empty}=\begin{cases}\theta F+(1-\theta)\left[\phi max(\gamma N, q\lambda C_2^H)+(1-\phi)S\right] & \text{if } F\le \tilde{F}_C^L \\ \theta\left[\phi F+(1-\phi)S\right]+(1-\theta)\left[\phi max(\gamma N, q\lambda C_2^H)+(1-\phi)S\right] & \text{if } \tilde{F}_C^L < F\le \tilde{F}_C^H\end{cases} \quad (3)$$

where $\tilde{F}_C^i = C_2^i$ for $\forall i = L, H$. Here, one may see an inter-state tradeoff in the debt payoff across *H*- and *L*-states at time 2. Specifically, under the empty creditor problem, the debt payoff could be enhanced with little legal uncertainty in the *H*-state, while it is reduced in the *L*-state, particularly when liquidation is quite costly, i.e., $S < q\lambda C_2^L$. The empty creditor case includes the possibility of liquidation due to the presence of excessive CDS holdings by creditors, who may be made better off by refusing to negotiate and triggering default leading to liquidation.

[10] The condition $N \le \lambda C_2^H$ is implicitly imposed. Without this upper bound of *N*, renegotiation between the firm and creditors could *always* fail and the debt price degenerates to *S*, the liquidation value. We exclude this degenerate case from our analysis.

Proposition 1: The impact of CDS contracts on a firm's debt is greater:

a) the more creditor-friendly are the bankruptcy codes of the country in which the firm operates $\left(\frac{\partial \Delta B}{\partial \gamma} \geq 0\right)$,

b) the higher is the liquidation value of the firm's assets $\left(\frac{\partial \Delta B}{\partial S} > 0\right)$,

c) the weaker is the contract enforceability in the jurisdiction in which the debt is issued $\left(\frac{\partial \Delta B}{\partial \lambda} < 0\right)$, *and*

d) the more concentrated is the shareholder ownership of the firm $\left(\frac{\partial \Delta B}{\partial q} < 0\right)$.

Proof: See Appendix B.■

When enforcement of a debt contract faces a significant limited commitment problem due to a weak institutional environment (low λ, low q), well-functioning credit derivatives contracts such as CDS can help firms overcome such institutional barriers. However, when the contingent payoff of the derivatives is affected by local legal regimes (low γ), the effects of the CDS contract may be significantly limited. Moreover, when creditors over-insure their debt positions through CDS contracts, liquidation rather than successful private renegotiation becomes more likely. Under such circumstances, a higher liquidation value helps reduce the cost of debt capital that the firm must raise for its positive NPV investments.

Proposition 2: The marginal impact of a firm's CDS contracts on the market value of the equity of the firm is greater:

a) the more creditor-friendly are the bankruptcy codes of the country in which the firm operates,
b) the higher is the liquidation value of the firm's assets,
c) the weaker is the contract enforceability in the jurisdiction in which the debt is issued, and
d) the more concentrated is the shareholder ownership of the firm.

Proof: Proposition 1 shows that the time-0 market value enhancement of a debt claim with a face value, F, is greater, under the assumed conditions in a) – d) above. In other words, the firm can raise the same market value of debt at time 0 by promising a smaller face value than F, say F', where $F'<F$ under these conditions. Equivalently, the firm can raise a larger amount of debt capital today at time 0, B', where $B'>B$, with the same promised payment F. In the latter case, the incremental debt capital

can be used to invest in positive NPV projects (if any). Hence, if the firm was previously capital-constrained and was unable to accept all positive NPV projects, it can undertake more such projects once CDS contracts are traded on the debt and add to the market value of its equity. In that case, investment goes up and so does shareholder value under the assumed conditions in a) – d) above.■

Proposition 3: Strategic default by shareholders of a firm with CDS contracts on its debt is less likely when the bargaining power of the firm's creditors with CDS is stronger. Consequently, the risk borne by shareholders increases:

a) the more creditor-friendly are the bankruptcy codes of the country in which the firm operates,
b) the weaker is the contract enforceability in the jurisdiction in which the debt is issued, and
c) the more concentrated is the shareholder ownership of the firm.

Proof: This follows directly from the condition, $\tilde{F}_C^i \geq F_C^i$ for $\forall i = L, H,$ when $\gamma N > q\lambda C_2$.■

D. Empirical Predictions

Based on the insights from the extended Bolton and Oehmke (2011) model presented above, we derive the following formal hypotheses:

Hypothesis 1: CDS introduction is more likely to enhance debt capacity in countries with creditor-friendly bankruptcy codes, low liquidation cost, weak contract enforceability, and more concentrated shareholder ownership.

Hypothesis 2: Any increase in investment after the introduction of CDS will be more evident in countries with creditor-friendly bankruptcy codes, low liquidation cost, weak contract enforceability, and more concentrated shareholder ownership.

Hypothesis 3: Following the introduction of CDS, the risk of equity returns increases more in countries with creditor-friendly bankruptcy codes, weak contract enforceability, and more concentrated shareholder ownership.

V. Methodology

The decision of whether to introduce CDS on an individual firm headquartered in a particular country is endogenous, and may be affected both by characteristics of the firm and characteristics of the country. For instance, it may well be that CDS contracts are introduced on firms that are already distressed and are likely to face a higher probability of default. In addition, the introduction of such

contracts may be affected by how friendly courts are to creditors in each country. If such endogeneity is not taken into account, estimates of the effect of CDS introduction could be biased, since the firms that have CDS introduced on them (i.e., the treated firms) or the countries in which CDS are introduced, may differ on relevant dimensions from firms or countries that do not have CDS introductions. That is, measured differences in the outcomes of CDS introduction may be due to differences in firms' or countries' characteristics, or covariates, rather than being due to the introduction of the CDS itself.[11]

We take endogeneity into account by deriving empirical predictions from the model and through our choice of empirical method. The method, propensity weighting, is relatively new and, to our knowledge, has not been used in the finance literature previously. The method that we use is developed in Li, Morgan and Zaslavsky (2017), who term these weights "overlap weights," since the method creates a sample with the most overlap in covariates between the treated and non-treated groups. The intuition behind the method is fairly straightforward. We begin by estimating the probability that individual firms will have CDS introductions. This step is similar to what one would do for propensity-score matching. However, matching can have the disadvantage that sample size is reduced, particularly in settings where there are multiple sets of characteristics that one wishes to take into account (e.g., firm and country characteristics). Propensity weighting, in contrast, uses every observation in the sample with a positive probability of being included in both treated and control groups.

Instead of matching, we use the estimated propensities to re-weight observations in the sample in order to reduce differences in the characteristics of treated and non-treated firms. In effect, this method creates a synthetic sample, where the distribution of pre-treatment variables, or covariates, is balanced across treated and non-treated firms. In the synthetic sample, there is no correlation between the treatment and the observed covariates. In addition, the size of the synthetic sample is typically much larger than that in the matching analysis, which is a particular advantage in

[11]In our international CDS market setup, the standard instrumental variable (IV) regression approach widely used in the literature (Saretto and Tookes, 2013; Subrahmanyam, Tang, and Wang, 2014) is unlikely to satisfy the exclusion restriction due to additional country level confounders. For example, lenders' Tier 1 capital ratios can be confounded with the banking regulations that could also affect the CDS availability of borrowers from the same country as the lenders. In addition, imposing "different country" restrictions on these lenders and borrowers results in a very significant (> 90%) reduction in sample size and a loss of power in our statistical tests; such a restriction also introduces the possibility of selection biases associated with factors related to firms' foreign financing opportunities.

our case as the number of firms that have CDS introduced on them is very small in comparison to the total number of firms in the sample.

Specifically, consider a sample of n firms. Each firm can belong to one of two groups, where Z_{it} is the (binary) variable that indicates group membership in year t; in our case, $Z_{it} = 1$ represents the treatment, or the case where a CDS is introduced on the firm. For each firm, we observe an outcome Y_{it} and a k-dimensional set of covariates X_{ikt} in each year t. The propensity score is the probability that we observe a CDS introduction, given the covariates: $p_{it}(x_t) = \Pr(Z_{it} = 1 \mid X_{ikt} = x_t)$.

The overlap weights proposed by Li, Morgan and Zaslavsky (2017) are:

$$w_{it}(x_t) = \begin{cases} p_{it}(x_t), & for\ Z_{it} = 0 \\ 1 - p_{it}(x_t), & for\ Z_{it} = 1 \end{cases} \tag{4}$$

Note that this method weights each individual firm (treated or non-treated) by the probability that it will be assigned to the *opposing* group (non-treated or treated). Consider an individual firm that has a high estimated propensity of treatment and does, in fact, receive the treatment; this type of firm is relatively common, as it has covariate values that are much more in common with other treated firms. This firm will be down-weighted in order to account for the fact that its observation is very common. In contrast, a treated firm with a low predicted probability of being treated will receive a higher weight. As a result, individual firms with a low (high) predicted probability of treatment that actually receive the treatment will be up-(down-) weighted; the up-weighting allows the low-propensity, treated firm to represent a larger group of similar firms that did not receive the treatment. Similarly, for non-treated firms, those with a low (high) probability of treatment will be down-(up-) weighted. This weighting of observations yields a synthetic sample of treated and untreated firms with balanced covariates by construction.

The method proposed by Li, Morgan and Zaslavsky (2017) is related to inverse probability weighting as described in Hirano and Imbens (2001). As the name suggests, inverse probability weighting uses the reciprocal of the estimated propensity to weight observations in the sample. However, inverse probability weighting has the drawback that when estimated probabilities are very small, weights can become extremely large and resulting estimates become unstable; rescaling of weights or arbitrary truncation/winsorization of extreme weights is typically used to address this problem. In contrast, the overlap weights proposed by Li, Morgan and Zaslavsky (2017), which we use in this paper, are bounded between 0 and 1, do not require truncation, result in exact balance of

the covariates and, for plausible distributions of propensity weights, are associated with smaller standard errors in the estimates of treatment effects. The overlap weighting method results in a synthetic sample that can be interpreted as the set of firms that have a substantial probability both of having CDS introduced, and not having CDS contracts available. We estimate the effects of CDS introduction on this propensity-weighted sample.

VI. Data

Our sample consists of all firms that have market data available on DataStream and accounting data available on WorldScope. We exclude financial firms, i.e., banks, insurance companies, real estate and other investment trusts, etc., (SIC codes 60-69). We also exclude all firm-year observations, which have zero or negative values for Total Assets. Further, we exclude non-primary issues, U.S. OTC Bulletin Board and "Pink Sheet" stocks, and firms that have missing country or firm identifiers. Our final sample consists of an unbalanced panel of more than 56,000 firms across 50 countries over the period 2001-2015. For these firms, we obtain monthly stock returns (in U.S. dollars) and market capitalization (in USD and local currency) for individual stocks, as well as returns on the value-weighted local and global DataStream stock market indices. Accounting variables are in millions of units of local currency and include determinants of CDS availability as well as general firm characteristics (such as total assets, sales, profitability, leverage, and cash and short-term investments). All firm-level variables are winsorized at the top and bottom five percentile and use logical limits to mitigate the effect of data errors.

Industry fixed effects are based on the Fama-French classification with 48 industries. Various legal, institutional, and financial market characteristics across countries are obtained from the data available from other existing studies (La Porta et al. (1998), Djankov, McLiesh, and Shleifer (2007), Djankov et al. (2008), among others) as well as several major cross-country databases including the International Country Risk Guide database, the World Bank and the Bank for International Settlements data. Finally, CDS data are obtained from Markit. Firms are identified as reference entities if they have CDS of any maturity during the observation year. Since the CDS data start in 2001, we can only identify CDS introductions beginning in 2002. When we refer to CDS firms and non-CDS firms, this pertains more precisely to firm-year observations with and without CDS introductions. Thus, prior to CDS introduction, firm-year observations of CDS firms are treated as non-CDS

firms. In our main results, we do not include firm-years of CDS firms after CDS introductions. Appendices C and D provide definitions and summary statistics of the variables used in the paper.

VII. Results

A. CDS Availability and Introductions

Summary statistics of the sample by country and industry are reported in Table 1. In Panel A, we report the number of firms that have CDS available on them in each country and by year. On average, there are approximately 1,225 firms with CDS available on them each year. It is clear that CDS availability is more common in developed countries; CDS on firms in the United States and Japan make up more than 64% of the sample. Other developed countries, such as the U.K., France, Germany and Canada, also have a relatively high proportion of CDS firms. In recent years, however, countries such as India, Hong Kong, Taiwan and Singapore have an increasing number of firms with CDS available.[12] The number of CDS introductions by country and year are reported in Panel B. CDS introductions were relatively high prior to the financial crisis, with the number of introductions declining sharply after 2007.

In Panel C, we report the number of firms in each industry that have CDS available on them by year, using the Fama-French 48 industry groupings. We see significant variation in the patterns of CDS availability across industries. Broadly speaking, industries associated with relatively high levels of property, plant and equipment (utilities, communication, transportation, oil & gas, and chemicals) appear more likely to have CDS based on their credits, while industries associated with services (fabricated products, personal services), commodities (agriculture, coal and precious metals) and government (private defense companies) tend to have lower levels of CDS availability.[13]

[12] Note that there are no Chinese firms in the sample. This is a useful example of the filters that we apply. The raw data from Markit includes 23 Chinese firms. Of those 23, 13 are classified as financial institutions, and 7 are government affiliates, which get dropped, due to their potential for being bailed out. The remaining 3 non-financial, non-government firms include two whose primary listing is not in China, but in Hong Kong; these two firms are excluded as a result of our requirement that the primary trading location and operations must be in the same country. Finally, the last firm (China Petroleum & Chemical Corporation) is removed because of a data error in the Thomson database.

[13] Note that, relative to the full sample, the number of firms with CDS available on them is relatively small. As a consequence, matching techniques will have the disadvantage that significant portions of the overall sample of firms are excluded from the analysis.

B. Firm Characteristics, Country Characteristics and CDS Introduction

The variation in CDS availability across sectors, observed in Panel C of Table 1, suggests that there are systematic differences in firms that have CDS introduced. In addition, the evidence reported in Panel A and Panel B of Table 1 suggests that differences in country characteristics may also influence CDS introduction. In this section, we examine the relation between firm and country characteristics and CDS introductions. The specific metrics of firm characteristics we consider include measures related to size (total assets measured in USD), profitability (Tobin's *q*, market-to-book equity ratio, return on assets, gross profit margin), cash flow (dividend, cash flow to sales, free cash flow to total assets), investment (cash and short-term investments, ratios of capital expenditure and R&D to assets, net PP&E to size), capital structure (market leverage at the firm and industry level, ratio of convertible debt to size, debt maturity), and risk (return volatility in local currency and USD, volatility of return on assets, net FX exposure). We also include the firm's age, and estimates of the firm's tax rate.

Country characteristics are standardized, and include four categories of the local legal and financial environment: creditor rights, property rights, the availability of private credit, and the concentration of equity ownership. To measure the strength of creditor rights, we follow La Porta, Lopez de Silanes, Shleifer and Vishny (1998) and consider four dimensions of creditor protection: 1) No automatic stay or asset freeze to protect the firm from creditors (*No Automatic Stay*); 2) Restrictions on the borrower entering reorganization without the creditors' consent (*Restrictions on Entry*); 3) Restrictions on current management administering the assets while in reorganization (*No Management Stay*); and 4) Priority of secured creditors in payments resulting from liquidation (*Secured Creditors First*). Each of the creditor rights variables is measured as an indicator variable, with a value of 1 indicating stronger creditor rights. An overall *Creditor Rights* index is the sum of the four individual indicator variables.

For measures of property rights, we use three indicators from the International Country Risk Guide developed by the PRS Group. *Law&Order* captures the strength and impartiality of the legal system as well as popular observance of the law. *Corruption Risk* is a measure of corruption within the political system that can threaten foreign investment. *Political Risk* measures political stability within the country using a variety of measures. Higher scores of these indices indicate better ratings (i.e. a better legal environment, less corruption, lower political risk) and, thus, better property rights.

The strength of the private credit market is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and the domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*), obtained from the BIS Total Credit Statistics and World Development Indicators database of the World Bank, respectively. Finally, we use a measure of *Ownership Concentration* to capture monitoring by equity investors in the firm. This is calculated as the average percentage of common shares owned by the three largest shareholders in the 10 largest non-financial, privately owned domestic firms in a given country (La Porta, Lopez de Silanes, Shleifer and Vishny (1998)).

We estimate logit regressions in which the dependent variable is equal to 1 if CDS are introduced on an individual firm in a particular year and 0 otherwise. In all regressions, we use year and industry fixed effects, with industries defined using the Fama-French 48 industry classifications. Standard errors are clustered at the firm level. All explanatory variables are lagged by one year.

Results from the logit regressions are reported in Table 2. Coefficients on the aggregate *Creditor Rights* index, and three of the four components of creditor rights are negative and statistically significant. Specifically, we see coefficients of -0.132 (*t*-statistic = 3.1) on the *Creditor Rights* index, and coefficients of -0.129 (*t*-statistic = 2.7), -0.316 (*t*-statistic = 6.2) and -0.130 (*t*-statistic = 2.7) on *Restrictions on Entry*, *No Automatic Stay* and *No Management Stay*, respectively. These results indicate that CDS are less (more) likely to be introduced on firms that operate in countries with strong (weak) creditor rights. The exception on the effects of creditor rights is the case where secured creditors receive priority in payments from the proceeds of liquidation (*Secured Creditor First*). For that variable, the coefficient is statistically significant and positive, indicating that CDS introductions are more likely in environments that feature priority protection for creditors in the event of liquidation.

Property rights variables have no significant effect on the propensity to introduce CDS. If the domestic credit market, scaled by GDP, is robust, CDS are more likely to be introduced (coefficient on *Domestic Credit to Private Sector* = 0.332, *t*-statistic = 5.4). This is consistent with CDS providing hedging benefits to domestic creditors, where that credit is a significant source of financing for firms. Finally, CDS are less (more) likely to be introduced in countries where ownership concentration is high (low); the coefficient on *Ownership Concentration* is negative and statistically significant (coefficient = -0.372, *t*-statistic = 7.3). This may indicate a stronger interest in CDS protection in circumstances where a relatively dispersed ownership base might be expected to engage in relatively

little monitoring. Ownership concentration is the most important determinant of CDS introduction across different country characteristics.

More generally, these results indicate that there are substantial differences in characteristics of firms that have CDS introduced from those that do not have CDS introduced. In Table 3, we report descriptive statistics for the sample of firms that have CDS introduced during our sample period, and the sample of firms that do not. In addition to reporting means and standard errors, we report statistical tests for differences between the two sub-samples, including *t*-tests for differences in the means and Kolmogorov-Smirnov (KS) tests for differences in the distributions of the characteristics. We also report a measure of bias between the two sub-samples, calculated as in Rosenbaum and Rubin (1985).

These results clearly indicate systematic differences in both firm and country characteristics for the sample of firms with CDS introductions. Differences in average characteristics are generally highly statistically significant. The Kolmogorov-Smirnov (KS) test for differences in distributions are also highly significant in all but one country characteristic (the distribution of *Secured Creditor First*). Moreover, the majority of the bias measures indicate that the differences between firm and country characteristics across the two sub-samples are also economically significant.

Combined, the results in Table 2 and Table 3 reinforce the case that firms with CDS are different along many dimensions from those without. It is virtually impossible to obtain firms with and without CDS that are closely matched across all dimensions. As a consequence, in estimating the effects of CDS introduction, we must control for these differences in covariates. In the next section, we discuss the construction of the overlap weights that we use to balance covariates across the subsamples and so correct for these differences in estimating the effects of CDS introduction.

C. Overlap Weight Calculation

To calculate overlap weights, we begin with logit regressions, again using an indicator variable for CDS introduction as the dependent variable. That is, we estimate the propensity that an individual firm *i*, operating in country *j* and in industry *k*, has a CDS introduced on it in year *t*. We use all firm and country characteristics described above jointly as explanatory variables, as well as industry and year fixed effects. Researchers such as Wooldridge (2002), Li, Morgan and Zaslavsky (2017) and Curtis et al. (2007) point out that in estimating the propensity model, parsimony is not a consideration, since the model is not used to draw inferences, but only to balance the covariates in the two subsamples.

We use the selection model to estimate the probability of CDS introduction $p_{it}(x)$, and then weight each observation by w_{it} as described in the methodology Section V above. This overlap weighting method balances the covariates in the two subsamples. In Figure 1, we illustrate the effect for selected covariates. In each panel, we present (in the left chart) the distribution of the covariate in the treated and control sample prior to overlap weighting and (in the right chart) the distribution of the covariate in treated and control sample following the application of overlap weights. It is clear that the weighting method balances the covariates between the subsamples of firms with, and without, CDS introductions. In Appendix E, we present descriptive statistics of the two subsamples before and after overlap weighting. By construction, the overlap weights produce an exact balance in the treated and control groups.

With the overlap weighting method, we model the propensity to have CDS introduced on the firm and use the resulting overlap weights to create a synthetic sample, in which CDS and non-CDS firms have the same distribution of covariates. Using this propensity-weighted sample, we estimate how CDS introduction affects firms, where the outcomes that we examine include the firms' capital structure, investment choices and risk.

D. CDS and Corporate Financial Policies

a) Leverage

In Table 4, we analyze the effects of CDS introduction on the firms' leverage. In separate regressions, we also analyze the effects of country characteristics and the interaction effects of CDS introduction and individual country variables related to creditor rights, property rights, credit markets and ownership concentration. In regression (1) of Table 4, CDS introduction is associated with a positive and significant increase in leverage. The magnitude of the coefficient of 0.0123 (*t*-statistic =2.20) is economically significant. Since the average firm leverage observed in our sample is 0.18, this coefficient indicates an increase in leverage associated with CDS introduction of approximately 6.8%. Moreover, the coefficient on CDS introduction is positive and significant in every specification that we consider in Table 4.[14]

We see evidence in line with Proposition 1 that, following CDS introduction, firms in countries with stronger creditor rights along two dimensions have significantly higher increases in lever-

[14] These results are broadly consistent with the findings of Saretto and Tookes (2013) and Subrahmanyam, Tang and Wang (2014) in the North American context.

age. Specifically, coefficients on the interactions of CDS introduction and both *Restrictions on Entry* and *Secured Creditors First* are positive and statistically significant. We consider each of these in turn. The significant effect of the restriction on entry into reorganization is consistent with the implications of the model. Note that the firm's entry into reorganization can serve as a credit event, and consequently trigger payments due under CDS obligations. In the context of the model, creditors who have access to CDS protection in legal environments that give them control over entry into reorganization have substantially higher bargaining power. This bargaining power allows the firm to overcome a limited commitment problem in the issuance of debt and, as a consequence, the firm is able to sustain more leverage. This result is particularly interesting in light of differences in events that trigger CDS in North America and other regions in the world. That is, since the "Big Bang" Protocol in 2009, reorganizations in North America are not included in the list of credit events that would trigger CDS payments, while they can trigger such payments in regions other than North America.[15]

The second dimension of creditor rights that is associated with a significant positive coefficient on leverage following CDS introduction is *Secured Creditor First*. This result appears to be consistent with the model's implication regarding liquidation cost. Specifically, the results of the model predict that the impact of CDS on debt, particularly when empty creditors could force the reference entities to liquidation rather than restructuring, will be larger where liquidation costs are lower, i.e., liquidation values are higher. In cases where the bankruptcy code specifies the priority of payout, the bargaining position of creditors should be stronger and the loss of value related to liquidation should be smaller (see, e.g., Davydenko and Franks (2008)).

In contrast to significant coefficients on *Restrictions on Entry* and *Secured Creditors First*, we find no significant effects for the interaction of CDS introduction and *No Automatic Stay* or *No Management Stay* on leverage. That is, while the availability of CDS appears to influence capital structure through effects on entry into and exit out of the reorganization process, CDS do not appear to affect leverage through differences in creditors' rights that bind *during* the reorganization process. Put simply, when considering the effects of CDS introduction on leverage, all creditor rights are not alike.

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[15] The inclusion of CDS where restructuring is excluded as a credit event should bias our results against finding significance for *Restrictions on Entry*.

We find evidence that the availability of CDS increases leverage in countries with weaker property rights; note that the coefficients on *Law&Order* and *Political Risk* are negative and highly significant. This evidence is consistent with the model's prediction that leverage increases more strongly in countries with weak contract enforceability. In other words, CDS provide a substitute for weak property rights, and so can increase credit in countries where poor enforceability of property rights act as a constraint on the supply of credit. This interpretation is consistent with the arguments in Bae and Goyal (2009) that, along with creditor rights, property rights are an important determinant of the credit that is available to firms. Indeed, across regressions, *Political Risk* is the country variable that is most important in conditioning the relation between leverage and CDS introductions.

The effect on leverage is reduced when the private credit market is already robust; the coefficient on *Private Credit* is negative and significant (coefficient = -0.0255, *t*-statistic = -3.5). Finally, we observe a positive and weakly significant coefficient on *Ownership Concentration*. This result is consistent with the implications of the model, and suggests that any reduction in monitoring or excessive lending by creditors in countries that have newly introduced CDS is mitigated in countries where equity ownership is concentrated, where creditors' bargaining power is weaker, and where equity holders are expected to engage in more monitoring.

b) Capital Investment

In contrast to the work on the effects of CDS on financing, the literature on the effects of CDS on other real activity inside the firm is relatively modest. Subrahmanyam, Tang and Wang (2017) show that U.S. firms that have CDS traded on them hold significantly more cash, perhaps in response to creditors who have incentives to be tougher in the event of a default. They suggest that CDS firms follow conservative liquidity policies in order to avoid costly negotiations with their creditors in the event of distress. Along similar lines, the results of Parlour and Winton (2013) suggest that the existence of CDS may allow for better investment decisions through more efficient risk-sharing.

If the availability of CDS affects firms' financing, as the results in Table 4 suggest, do these changes represent only changes in capital structure, or is the financing used for additional investment? In addition, does the effect on investment vary with the local legal environment? If CDS contracts allow for better risk-sharing, in addition to strengthening creditors' bargaining power, then Proposition 2 predicts that their effect on investment, cash holdings and risk taking should be larger in countries with weak creditor rights, less well-developed financial markets, less enforceability of law, and in civil law countries, where case law and precedent are less relevant. In Table 5, we exam-

ine the association between CDS introduction and capital investment, including the interaction between CDS availability and country characteristics.

In the baseline regression, which looks at the average treatment effect across all countries, we find little evidence that the introduction of CDS has a significant effect: the coefficient is small and not significantly different from zero. However, there is some evidence that the CDS effect on capital investment is positive in countries with stronger creditor rights. In addition, this evidence appears to be driven by a positive effect in countries where there are restrictions on entry to reorganization. In particular, the coefficient on *Restrictions on Entry* is positive and significant (coefficient = 0.0054, *t*-statistic = 2.7); this variable is the most important country characteristic for investment. Recall that this is also the case where leverage effects were observed to be positive and significant. This suggests that the increase in leverage is financing at least some incremental capital investment.

In addition, there is modest evidence that the effect of CDS introductions in countries with weak property rights also has a positive effect on investment. We observe a negative coefficient on *Political Risk,* although both the magnitude of the coefficient and its statistical significance are lower (coefficient = -0.0048, *t*-statistic = 1.7). This is consistent with the interpretation that the hedging benefits of CDS, where obligations are determined and payments occur outside of the local political environment, can compensate for political risk in the firm's operating environment. As a consequence, the supply of credit increases and incentivizes investment.

c) Research and Development

Acharya, Amihud and Litov (2011) argue that stronger creditor rights may affect firms' appetite to take on risky projects. In effect, the harsher penalties associated with distress in an environment with strong creditor protections reduce firms' ability to take on good, but risky investments. We explore the effects of CDS introduction on investments that might be considered particularly risky: research and development. Specifically, we estimate the effect of CDS introduction on R&D share, measured as the ratio of R&D expenses to the sum of R&D expenses and capital expenditures.[16]

The results in Table 6 show that CDS introductions are associated with a decline in the share of R&D in capital investment; coefficients in all specifications are negative, and are frequently statistically significant. In the baseline regression, the magnitude of the coefficient is 1.15%, indicating

[16] If both R&D expenses and capital expenditures is equal to zero, we code the share of R&D to be 0, rather than set it to be missing.

that CDS availability is associated with an approximate 1% decline in the share of research and development in real investment. Since the average share of research and development to total investment in our sample is approximately 15 %, this represents a decline in R&D of close to 8%, which is economically significant. This result is consistent with CDS introduction improving creditor rights (if there is no legal barrier that limits contractual efficacy), and also acting as a disincentive to risky investment.

In addition, however, interactions between CDS introduction and country variables indicate that the firm's environment has a significant influence on this effect. In particular, as we observed in both leverage and investment decisions, creditors' ability to restrict entry to reorganization is important. The coefficient on *Restriction on Entry* is negative and significant; this indicates that investment in particularly risky projects, measured by the R&D share, declines more sharply when CDS are available (i.e, when creditor rights are strengthened) and creditors act as a gatekeeper to reorganization. That is, although leverage increases in these circumstances, the incremental investments made by the firm are more likely to be made in tangible assets that can be collateralized.

In countries with robust credit markets, and relatively strong property rights, the effect of CDS introduction on R&D share is significant and positive: The coefficients on *Domestic Credit to Private Sector*, *Private Credit* and *Political Risk* are all statistically significant, with *t*-statistics of 2.7, 2.6 and 3.1, respectively. This suggests that the hedging benefits of CDS facilitate incremental investment in risky projects where monitoring abilities are strong, and the risk of expropriation is relatively low. In terms of economic significance, *Political Risk* is the single most important country interaction term.

d) Risk

In addition to examining the influence of CDS introduction on research and development as a proxy for risk, we also estimate their effect on the idiosyncratic volatility of equity returns in the reference entities. These results are presented in Table 7. The baseline regression estimates, and other specifications included in the table, indicate that there is little evidence that CDS introductions affect risk. However, as in our other results, we find evidence in line with Proposition 3 that the local environment has some influence on the effects of CDS availability.

In particular, we continue to find that creditor restrictions on firms' ability to enter bankruptcy are important. Where these restrictions are in place, idiosyncratic risk increases significantly when CDS are introduced. Given the increased propensity to invest in tangible capital in these cir-

cumstances, observed in Table 6, the increase in volatility seems unlikely to be the result of an increase in the underlying project risk. Instead, consistent with Proposition 3, this result suggests that, where creditors influence firms' ability to seek protection from payment obligations and the presence of CDS contracts bolsters creditor rights, additional residual risk is borne by equity holders rather than creditors to the firm. This interpretation is also consistent with the increase in leverage observed under these circumstances in Table 4, i.e., incremental credit is available precisely because creditor rights receive additional protection, strategic default becomes less likely and risk-shifting to the firms' creditors is more difficult. In fact, this result may also at least partially explain the firms' shift to investment in tangible, rather than intangible, projects. We also find that idiosyncratic risk is lower after CDS introduction for firms in countries with weaker property rights, especially higher political risk, more robust credit markets and lower ownership concentration.

E. Robustness Tests

We carry out several additional tests to document the robustness of our results. In particular, in Table 8 we estimate the regressions in Tables 4-7 including lagged firm characteristics as additional controls. The firm characteristics for regressions with leverage (Panel A) are *Debt Maturity*, *Market/Book*, *PPE/Size*, *Cash Flow/Sales*, *Cash and Short-term Investments/Total Assets (log)*, *Total Assets in USD (log)*, *ROA Volatility (log)*, *Tax Rate*, and *Leverage Market Value (Industry Median)*. The firm characteristics for capital investment and R&D share (Panels B and C, respectively) are *Market/Book*, *Return On Assets (3y)*, and *PPE/Size*, while we include *Market/Book*, *Leverage Market Value*, and *Total Assets in USD (log)* for risk in Panel D. The inclusion of the additional controls has only a marginal effect on the sample size. Overall, the economic magnitudes and statistical significance of the effects of CDS introduction are preserved; qualitatively, the results are robust to these augmented controls, although there is some variation in the results related to interactions of CDS with risk. While many of these firm characteristics are inputs into the overlap weights, we do not observe that their inclusion makes the estimation of differences in outcome variables more efficient.

Bun and Harrison (2014) show that the OLS estimator of the coefficient of the interaction term between an endogenous regressor and an exogenous covariate is consistent, and asymptotically normally distributed, under typical conditions.[17] Correspondingly, in our stetting, the main variable

[17] These conditions are generally satisfied for higher order dependence between endogenous and exogenous regressors, i.e., the conditional joint independence between the regression outcome and the endogenous covariates, given the "exogenous" variable.

of interest is the interaction between endogenous (CDS Introduction) and exogenous (legal, institutional characteristics) regressors.[18] In Appendix F, we present results analogous to Tables 4-7 using ordinary least squares (OLS), i.e., without applying the overlap weights; Panels A-D reports the OLS results for leverage, capital investment, R&D share, and risk, respectively. The sample for the OLS estimation is substantially larger than that used in the main tables since we do not require the joint availability of all lagged firm and country characteristics necessary to estimate the overlap weights. However, the point estimates of our main interaction terms are similar in terms of signs and significance levels to those in the main tables.

Finally, note that the evidence in Table 1 indicates that approximately 40% of the CDS introductions in our sample occur for U.S. reference entities, for which restructuring has been excluded as a trigger event since the 2009 Big Bang Protocol.[19] To highlight the truly global aspects of our main results as well as to confirm that No Restructuring (XR) CDS contracts are not driving our main findings, we re-estimate our tests excluding U.S. firms from the sample.[20] Although removing U.S. firms reduces the overall sample size, we are still left with more than 800 CDS introductions and a substantial amount of cross-sectional variation in the sample. We find that the results in the ex-U.S. sample are qualitatively similar to those reported in Tables 4-7, with the sign and significance of the variables of interest comparable to those reported in our main tests. These results are reported in Appendix G.

VIII. Conclusion

We analyze the impact of CDS introduction on real decision-making within the firm, taking into account features of the local economic and legal environment of firms. We extend the model of Bolton and Oehmke (2011) in order to consider uncertainty regarding whether actions taken by the reference entity will trigger CDS obligations. The model provides structure to our analysis and gener-

[18] For similar implications of the econometrics, see also Annan and Schlenker (2015), among many others. It is also worth noting that all of our creditor rights variables and the ownership concentration variable are taken from La Porta et al. (1998), and thus, they are predetermined prior to the beginning of our sample period.

[19] As a result, No Restructuring CDS contracts form the majority of the U.S. single name corporate CDS contracts in the post-Big Bang period.

[20] Canadian single name corporate CDS are also XR CDS contracts in the post-Big Bang time period. Further excluding Canadian firms from our robustness test does not change our conclusions. These results are available upon request.

ates empirical predictions that we test in a sample of more than 56,000 firms across 50 countries over the period 2001-2015.

We find that CDS are more likely to be introduced on firms that are headquartered in countries with weaker creditor rights, a stronger orientation toward bank financing, and lower levels of ownership concentration. These results suggest that CDS are considered particularly valuable in circumstances where local lenders can use them to hedge their exposure to borrowers, and where dispersed shareholders might be expected to do relatively little monitoring.

We use a novel overlap weighting method to control for endogenous differences in the samples of firms with and without CDS. We find that, after CDS introductions, underlying firms increase leverage in countries with stronger creditor rights along two dimensions. The first dimension is the case where creditor consent is required to enter reorganization. These results are consistent with the predictions of the model: creditors with CDS protection and control over entry into reorganization have substantially higher bargaining power. This mitigates the limited commitment problem faced by the firm, and allows for higher levels of leverage. The second dimension is the case in which the bankruptcy code requires that secured creditors are paid first out of liquidation proceeds. This is consistent with the model's prediction that leverage increases more strongly with the introduction of CDS, and their enhancement of creditor rights, if liquidation costs are low. In addition, the model predicts that CDS introduction would increase leverage more strongly in countries with weaker contract enforceability and high levels of concentration in equity ownership. The results are consistent with these predictions as well.

We also find evidence that the interaction between the CDS contract design and local bankruptcy codes influences the investment policies of the firm. Specifically, in cases where there are creditor restrictions on firms' entering reorganization - the circumstance where leverage increases - the presence of CDS increases the level of capital investment by the firm. These effects are mitigated when the domestic credit market is robust, and there is some weak evidence that the increase in investment is larger in countries where property rights indexes are weaker. We also find strong evidence that the effect of CDS introductions on riskier investments, which we measure using the share of R&D in total real investment, differs markedly across legal environments. That is, we find that the introduction of CDS decreases the share of R&D in countries with creditor restrictions on entering bankruptcy. This suggests that the introduction of CDS may provide an incentive for firms to invest more heavily in tangible capital. Interestingly, in countries where managers are not allowed to

participate in the administration of the company during bankruptcy, the introduction of CDS increases the share of R&D in capital spending. We also find strong evidence that firms in countries with lower political risk, and stronger domestic credit markets, experience a larger increase in R&D share following the introduction of CDS.

Finally, we examine the effect of CDS introduction on the volatility of the equity returns of the reference entities. We find that where creditor restrictions on firms' ability to enter bankruptcy exist, idiosyncratic equity return volatility increases significantly. Given the increased propensity to invest in tangible capital in these circumstances, the increase in volatility seems unlikely to be the result of an increase in the underlying project risk. Instead, higher volatility could indicate that where creditors influence firms' ability to seek protection from payment obligations and the presence of CDS contracts bolsters creditor rights, the likelihood of strategic default declines and additional residual risk is borne by equity holders rather than the creditors of the firm.

Overall, we find substantial evidence that the introduction of CDS affects real decisions of non-financial firms, including the choices of leverage, investment, and the risk of the investments taken by the firm. Importantly, we find that the legal and market environment in which the reference entity operates has an influence on the impact of CDS. The effect of CDS is larger in countries where the uncertainty regarding their obligations is reduced, and where they mitigate weak property rights. These results highlight the incomplete nature of CDS contracts in global capital markets, a feature that has been largely overlooked in the burgeoning academic literature on credit derivatives. We demonstrate that real world credit risks interact meaningfully with local legal regimes, since the recognition of underlying credit events that could trigger contractual payments is subject to the uncertainty of regulatory or judicial interpretation. Given the recent wave of credit event definition changes by ISDA, which aims to alleviate such legal uncertainty in CDS contracts, measuring the extent to which such contractual remedies can effectively restore the hedging efficacy of the credit derivatives market is an important unanswered research subject. We hope to return to this question in our subsequent research.

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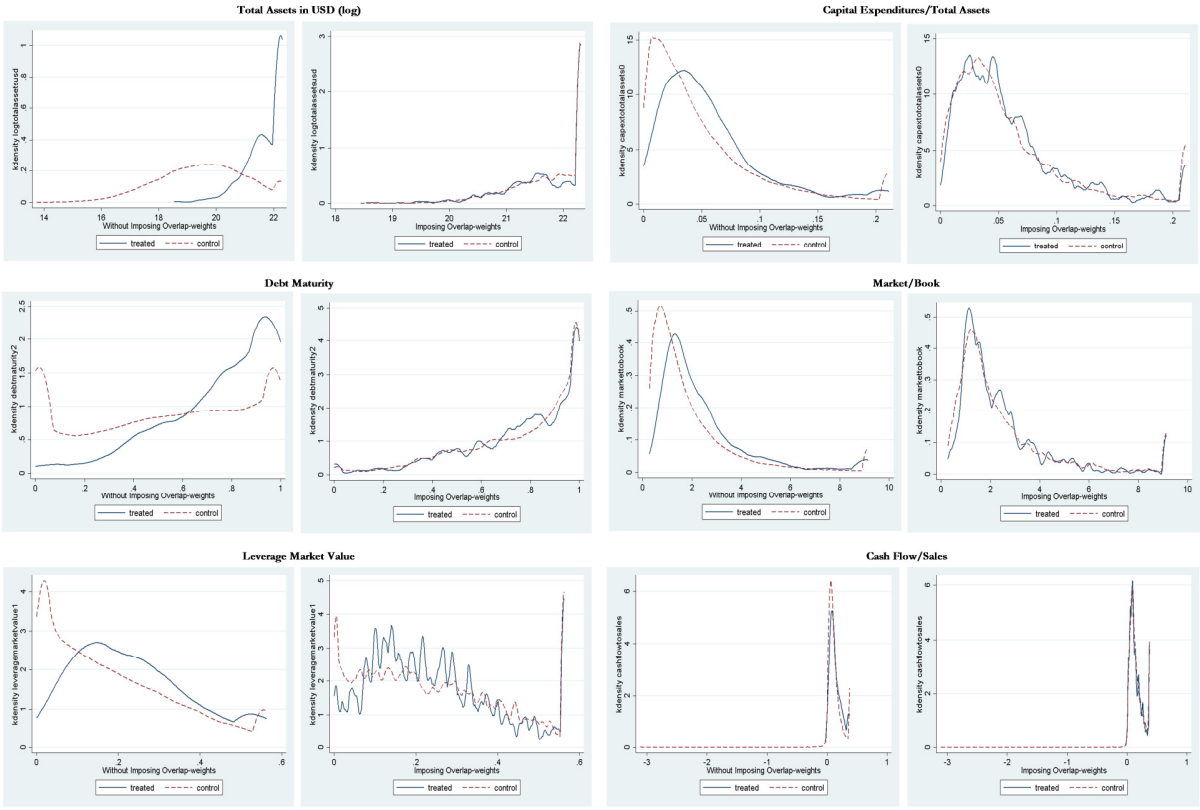
Figure 1: Covariate Balancing of Sample Firms

The figure shows the covariate balancing of sample firms a year prior to CDS introduction by plotting the distributions for treated firms (i.e. firms in the year of CDS introduction) and control firms (i.e. firms in years without CDS introductions) before and after imposing overlap-weights. Panel A shows results for selected firm characteristics, while Panel B shows results for selected country characteristics. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

Panel A: Firm Characteristics



Panel B: Country Characteristics

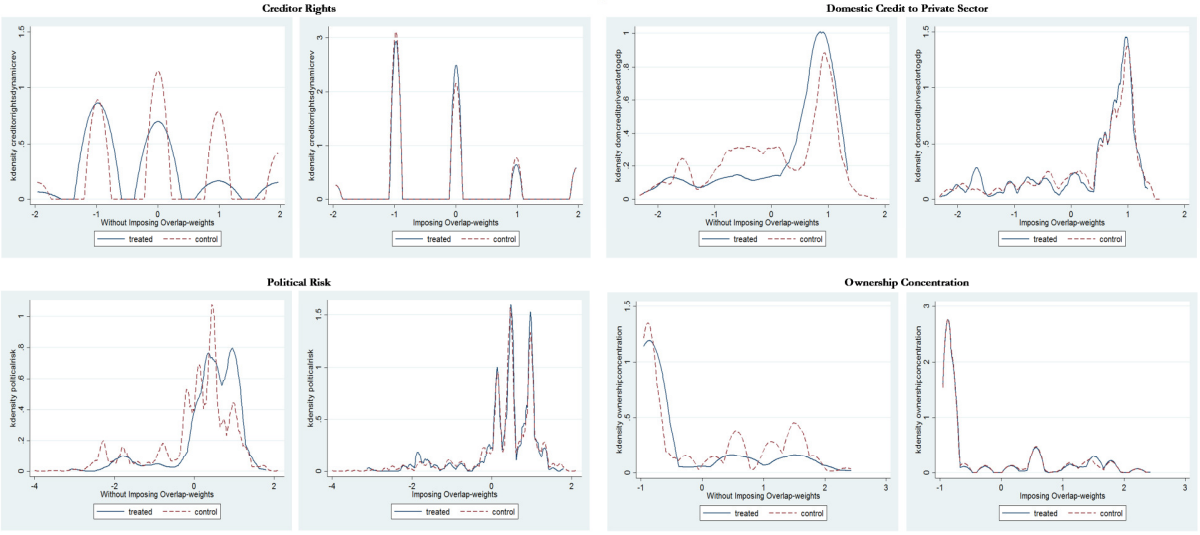


Table 1: International CDS Introductions and Availability

The table shows the number of CDS reference entities by year across countries (Panel A) and industries (Panel C). It also shows the number of CDS introductions by year across countries (Panel B). The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

Panel A: CDS Availability by Country

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
Argentina						1	1	1	1	2	3	3	3	3		2
Australia	9	17	20	23	23	23	22	22	22	22	22	22	23	23	17	21
Austria			1	1	2	4	5	5	5	5	6	6	6	6	2	4
Bahrain										1	1	1	1	1		1
Belgium		1	1	4	4	4	3	4	4	4	4	4	4	5		4
Brazil				2	6	7	9	12	16	16	14	14	13	12		11
Canada	9	18	25	37	42	42	39	39	37	37	34	34	32	34	3	31
Chile			1	2	3	3	5	5	7	7	7	7	7	7		5
Colombia						1	1					1	1	1		1
Czech Republic		1	1	1	2	2	2	1	1	1	1	1	1	1		1
Denmark	1	1	1	3	3	3	3	3	3	3	4	4	4	4		3
Egypt							1	1	1	1	1	1	1	1		1
Finland	5	7	6	7	7	7	7	8	8	8	8	8	7	7		7
France	28	36	42	44	45	45	44	45	43	42	43	45	47	48	4	40
Germany	17	20	29	36	37	40	41	43	45	45	44	44	45	45	10	36
Greece	1	2	2	2	2	3	3	3	3	2	2	2	2	2		2
Hong Kong	4	5	7	10	14	21	30	37	38	37	39	44	45	45	7	26
Hungary						1	1	1	1	1	1	1	1			1
India		1	1	1	6	15	32	49	50	52	53	52	51	52	43	33
Indonesia					2	5	5	5	7	7	8	9	9	9		7
Ireland		1	1	1	2	1	1	1								1
Israel		1	1	1	1	1	1	1	1	1	2	3	3	3		2
Italy	7	9	10	14	15	17	18	19	20	20	18	19	22	23		17
Japan	27	61	121	202	247	267	285	289	288	286	282	278	280	276	255	230
Kazahkstan							1	1	1	1	1	1	1	1		1
Korea, Republic Of	4	9	10	11	16	17	18	20	21	23	25	27	27	27		18
Luxembourg					2	1										2
Malaysia	2	2	2	3	6	6	6	7	7	7	7	7	7	7	4	5
Mexico			1	1	3	4	7	9	10	10	12	11	11	11		8
Netherlands	8	9	13	15	15	16	12	12	12	12	12	12	12	13	1	12
New Zealand	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	2
Norway	2	2	2	3	5	5	5	7	7	6	6	6	6	6		5
Philippines			1	2	3	5	6	6	6	6	6	7	7	7	1	5
Poland	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
Portugal	2	3	3	4	4	4	4	4	4	4	4	4	4	5		4
Qatar								1	1	1	1	1	1	1		1
Romania					1	1	1	1	1	1	1	1	1			1
Russian Federation					2	3	5	5	5	5	5	5	4	4		4
Saudi Arabia							1	1	2	2	2	2	2	2	1	2
Singapore	1	2	3	3	5	5	7	7	7	7	9	10	10	10	1	6
South Africa				1	2	2	2	4	5	5	6	6	6	6	4	4
Spain	5	7	8	11	11	11	13	13	12	10	10	12	12	12		11
Sri Lanka								1	1	1	1	1	1	1		1
Sweden	7	10	10	12	12	14	14	14	14	14	13	13	12	13	1	12
Switzerland	4	7	7	9	11	11	12	14	13	13	12	13	13	13		11
Taiwan			6	16	20	24	26	27	27	26	26	28	27	27		23
Thailand		2	2	2	6	7	10	9	9	10	8	8	8	8		7
Turkey						2	2	2	2	2	1	1	1	1		2
United Arab Emirates						1	1	1	1	1	1	1	1	1		1
United Kingdom	31	48	62	65	66	69	64	59	58	58	60	60	55	58	32	56
United States	251	347	447	566	615	641	670	661	655	634	626	623	609	599	130	538
Total	427	631	849	1,117	1,271	1,365	1,449	1,483	1,485	1,462	1,455	1,467	1,450	1,445	519	1,225

(continued)

Table 1: International CDS Introductions and Availability (continued)

Panel B: CDS Introductions by Country

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Argentina					1				1	1					3
Australia	8	3	3	2			3				1	1			21
Austria		1		1	2	1				1					6
Bahrain									1						1
Belgium	1		3				1						1		6
Brazil			2	4	1	2	3	5							17
Canada	9	7	12	6	3	1		1	1		1		1		42
Chile		1	1	1	1	1		2							7
Colombia					1						1				2
Czech Republic	1			1											2
Denmark			2							1					3
Egypt						1									1
Finland	2	1					1								4
France	10	6	4	1			1			1	2	2	1		28
Germany	4	9	7	3	3	2	2	2	2						34
Greece	1				1										2
Hong Kong	1	2	3	4	7	9	7	1		2	5	1			42
Hungary					1										1
India	1			5	9	17	17	3	2			3			57
Indonesia				2	3			2		2					9
Ireland	1			1											2
Israel	1									1	1				3
Italy	2	1	5	1	2	1	1	1			1	2	1		18
Japan	34	62	81	46	24	20	10	6	1	2		2			288
Kazahkstan						1									1
Korea, Republic Of	5	1	1	5	1	1	2	1	2	2	2				23
Luxembourg				2											2
Malaysia			1	3			1								5
Mexico		1		2	1	3	2	1		2					12
Netherlands	2	3	2	1	1								1		10
New Zealand				1							1				2
Norway			1	2			2								5
Philippines		1	1	1	2	1					1				7
Poland															0
Portugal	1		1										1		3
Qatar							1								1
Romania				1											1
Russian Federation				2	1	2									5
Saudi Arabia						1		1							2
Singapore	1	1		2		2		1		2	1				10
South Africa			1	1			2	1		1					6
Spain	2	1	3			2	1				1				10
Sri Lanka							1								1
Sweden	3		2		2										7
Switzerland	3		2	2		2	2								11
Taiwan		6	10	4	4	2	1				2				29
Thailand	2			4	1	4			1						12
Turkey					2										2
United Arab Emirates					1										1
United Kingdom	18	14	5	2	7	4	4	1	2	2	2				61
United States	105	116	113	74	46	67	15	9	6	11	19	6	5	1	593
Total	218	237	266	187	128	147	80	38	19	31	41	17	11	1	1,421

(continued)

Table 1: International CDS Introductions and Availability (continued)

Panel C: CDS Availability by Industry

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average
Agriculture	1	1	2	2	4	5	6	5	7	6	7	7	6	6	3	5
Food Products	11	14	20	24	31	33	36	36	36	35	36	38	38	37	18	30
Candy & Soda	4	4	5	9	10	11	12	11	11	8	9	9	9	9	1	8
Beer & Liquor	6	9	13	16	16	18	18	17	17	17	17	17	15	15	6	14
Tobacco Products	9	9	8	9	9	10	10	8	8	8	8	8	8	8	1	8
Recreation	4	7	8	12	13	12	12	12	12	11	11	11	12	12	8	10
Entertainment	5	6	8	12	14	16	19	17	18	18	16	17	16	17	7	14
Printing and Publishing	9	10	13	18	21	24	20	18	18	18	18	18	17	17	6	16
Consumer Goods	15	17	22	24	25	25	25	27	26	26	26	27	27	26	9	23
Apparel	5	6	8	12	12	11	9	10	10	11	11	9	10	9	1	9
Healthcare	3	4	10	13	13	14	14	16	17	17	17	16	16	15	2	12
Medical Equipment	4	7	10	11	12	12	15	15	15	14	15	16	17	17	7	12
Pharmaceutical Products	10	20	26	38	41	45	51	49	43	42	41	40	39	41	12	36
Chemicals	19	30	40	54	65	64	64	68	69	70	67	67	68	68	25	56
Rubber and Plastic Products	1	1		3	3	3	4	5	5	5	5	4	4	4	3	4
Textiles		1	2	4	4	4	5	6	6	6	6	6	6	5	4	5
Construction Materials	7	15	19	27	31	30	34	37	37	37	36	36	35	35	13	29
Construction	3	11	17	27	33	42	56	62	64	64	64	68	66	67	31	45
Steel Works Etc	10	13	18	29	35	35	38	44	43	44	45	46	46	46	25	34
Fabricated Products								1	1	1	1	1	1	1	1	1
Machinery	10	25	35	45	50	55	56	56	56	55	56	56	56	57	33	47
Electrical Equipment	3	6	10	12	17	18	21	22	22	21	21	18	18	18	10	16
Automobiles and Trucks	25	34	39	47	56	60	63	64	63	60	61	63	63	60	22	52
Aircraft	6	8	10	11	11	11	10	10	11	11	11	11	11	11	1	10
Shipbuilding, Railroad Equipment							2	2	2	3	4	4	3	4	2	3
Defense	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2
Precious Metals	1	1	1	3	3	2	3	3	3	3	3	3	3	3		3
Non-Metallic and Industrial Metal Mining	3	8	13	15	16	15	17	18	18	18	19	19	18	19	6	15
Coal			1	4	5	5	6	6	6	6	6	7	6	6		5
Petroleum and Natural Gas	27	45	55	63	66	76	81	81	81	80	77	82	80	83	9	66
Utilities	43	71	87	117	137	148	150	153	150	146	147	141	143	139	32	120
Communication	46	55	74	79	92	97	101	104	107	103	102	106	105	102	24	86
Personal Services	1	3	3	4	6	6	7	7	7	8	8	9	7	8	1	6
Business Services	13	21	35	52	63	68	73	73	72	75	75	80	77	78	27	59
Computers	9	9	14	19	23	27	28	27	28	27	26	27	27	27	11	22
Electronic Equipment	15	22	38	57	65	71	69	71	71	68	67	62	61	60	22	55
Measuring and Control Equipment	4	8	10	12	13	13	14	14	14	14	13	13	13	13	8	12
Business Supplies	11	12	14	21	24	26	32	32	34	34	31	33	33	33	11	25
Shipping Containers	4	5	10	12	12	12	13	13	13	14	14	14	14	13	2	11
Transportation	21	35	52	75	79	85	87	87	89	86	88	91	94	93	44	74
Wholesale	8	14	19	22	33	36	37	40	40	38	39	38	36	36	21	30
Retail	37	44	53	69	74	81	92	94	91	90	90	87	85	85	34	74
Restaurants, Hotels, Motels	10	15	20	26	26	30	29	31	33	33	32	33	33	33	13	26
Other Industries	3	4	6	6	6	7	8	9	9	9	7	7	6	7	2	6
Total	427	631	849	1,117	1,271	1,365	1,449	1,483	1,485	1,462	1,455	1,467	1,450	1,445	519	1,195

Table 2: Propensity of CDS Introduction

The table shows the results of logit regressions, where the CDS introduction dummy (i.e., only the first year of CDS trading year for each firm) is used as dependent variable. Firm characteristics and (standardized) country characteristics are used as explanatory variables, which are all lagged by one year. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the creditor rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). All regressions include firm characteristics (the natural logarithm of total assets (in USD), Tobin's *q*, market-to-book equity ratio, return on assets (3-year average), gross profit margin (3-year average), dividend dummy, cash flow to sales, free cash flow to total assets, the natural logarithm of cash and short-term investments, capital expenditures to total assets, R&D to assets, net PP&E to size, market leverage, industry median market leverage, convertible debt to size, debt maturity, return volatility in local currency and USD, volatility of re-turn on assets, net FX exposure, firm age, and tax rate), year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample period is from 2002 to 2015.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Creditor Rights					Property Rights			Private Credit Availability		
	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
Country Variable	-0.132***	-0.129***	-0.316***	-0.130***	0.240***	0.049	-0.012	-0.016	0.332***	-0.070	-0.372***
	(0.042)	(0.048)	(0.051)	(0.049)	(0.048)	(0.041)	(0.049)	(0.056)	(0.062)	(0.054)	(0.051)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005
Pseudo R-Squared	0.396	0.396	0.400	0.396	0.398	0.395	0.395	0.395	0.399	0.395	0.401

Table 3: Firm and Country Level Characteristics Without Imposing Overlap-Weights

The table compares firm and country level characteristics between firm-years with CDS introductions (Treated) and without CDS introductions (Control) in the prior year. In particular, it shows the mean and standard errors for treated and control firms, the percentage bias according to Rosenbaum and Rubin (1985) as well as test statistics and *p*-values of *t*-tests and Kolmogorov-Smirnov tests. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit. The sample is limited to firm-year observations with all the reported firm and country level variables being jointly available. Given the differences in characteristics between treated and control firms, we use overlap weights (Li, Morgan, and Zaslavsky, 2017) for our main analysis that balances the covariates between these samples, as shown in Appendix E.

	Treated (N=782)		Control (N=79,223)			t-test		Kolmogorov-Smirnov test	
	Mean	Std. Err.	Mean	Std. Err.	% Bias	*t*	*p*-value	D	*p*-value
Firm Characteristics									
Cash Flow/Sales	0.148	0.004	0.112	0.001	28%	6.61	0.000	0.1394	0.000
Convertible Debt/Size	0.011	0.001	0.002	0.000	53%	22.07	0.000	0.2050	0.000
Debt Maturity	0.756	0.008	0.528	0.001	78%	18.68	0.000	0.3067	0.000
Dividend	0.835	0.013	0.759	0.002	19%	4.93	0.000	0.0757	0.000
Free Cash Flow/Total Assets	0.025	0.002	0.026	0.000	-2%	-0.49	0.628	0.0658	0.002
Gross Profit Margin (3y)	0.306	0.006	0.271	0.001	20%	5.32	0.000	0.1023	0.000
Leverage Market Value	0.242	0.005	0.191	0.001	33%	8.95	0.000	0.2035	0.000
Leverage Market Value (Industry Median)	0.167	0.003	0.152	0.000	21%	5.82	0.000	0.1067	0.000
Age (log)	2.793	0.028	2.557	0.003	31%	8.85	0.000	0.2776	0.000
ROA Volatility (log)	-3.900	0.031	-3.543	0.004	-38%	-10.02	0.000	0.1487	0.000
Total Assets in USD (log)	21.772	0.023	19.529	0.006	187%	40.08	0.000	0.6941	0.000
Market/Book	2.482	0.069	1.944	0.007	28%	8.06	0.000	0.2362	0.000
Net FX-Exposure	0.119	0.008	0.117	0.001	1%	0.2	0.843	0.0747	0.000
PPE (Net)/Size	0.394	0.010	0.390	0.001	1%	0.37	0.710	0.0612	0.006
Return On Assets (3y)	0.062	0.002	0.060	0.000	3%	0.71	0.476	0.0511	0.035
Tax Rate	0.344	0.005	0.305	0.001	27%	6.87	0.000	0.1763	0.000
Tobin's Q	1.322	0.034	1.182	0.004	14%	3.84	0.000	0.2133	0.000
Return Volatility in LC (log)	-1.146	0.013	-0.969	0.002	-43%	-10.6	0.000	0.1810	0.000
Return Volatility in USD (log)	-1.108	0.013	-0.915	0.002	-46%	-11.53	0.000	0.1976	0.000
Capital Expenditures/Total Assets	0.060	0.002	0.051	0.000	18%	4.88	0.000	0.1571	0.000
R&D/Total Assets	0.014	0.001	0.010	0.000	15%	4.43	0.000	0.1154	0.000
Cash and Short-term Investments/Total Assets (log)	-2.718	0.046	-2.379	0.005	-26%	-7.11	0.000	0.1174	0.000
Country Characteristics									
Restrictions on Entry	-0.211	0.030	0.094	0.004	-32%	-8.12	0.000	0.1328	0.000
No Automatic Stay on Assets	-0.301	0.029	0.099	0.004	-43%	-10.81	0.000	0.1869	0.000
Management Does Not Stay	-0.141	0.036	0.059	0.004	-20%	-5.59	0.000	0.0997	0.000
Secured Creditors First	0.109	0.030	0.033	0.003	8%	2.2	0.028	0.0231	0.804
Law&Order	0.241	0.034	-0.049	0.004	30%	7.99	0.000	0.1323	0.000
Corruption	0.091	0.028	0.009	0.003	9%	2.33	0.020	0.1495	0.000
Political Risk	0.388	0.028	0.018	0.003	42%	10.63	0.000	0.2319	0.000
Domestic Credit to Private Sector	0.349	0.032	0.062	0.003	31%	8.36	0.000	0.2489	0.000
Private Credit	0.026	0.029	-0.010	0.003	4%	1.02	0.306	0.1328	0.000
Ownership Concentration	-0.334	0.033	0.086	0.004	-43%	-11.26	0.000	0.2629	0.000

Table 4: Effects of CDS on Leverage

The table shows the average treatment effect of CDS introductions on the market leverage (defined as the sum of total debt and preferred stock divided by market value of total asset) of the treated (ATET) using overlap weights (Li, Morgan, and Zaslavsky, 2017). The treatment is the introduction of CDS (i.e., only the first year of CDS trading year for each firm). The regressions further include its interaction effects with lagged (standardized) country characteristics, as well as the lagged country variables themselves. The use of overlap weights ensures that covariates are perfectly balanced between treated firms and control firms in the year before treatment, as shown in Appendix E. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). All regressions include year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0042	0.0152**	-0.0055	-0.0060	0.0143**	-0.0192***	-0.0085	-0.0308***	-0.0105	-0.0255***	0.0105*
		(0.0055)	(0.0067)	(0.0064)	(0.0056)	(0.0061)	(0.0056)	(0.0072)	(0.0074)	(0.0068)	(0.0073)	(0.0062)
Country Variable		-0.0010	-0.0140***	0.0009	0.0118***	-0.0095***	-0.0004	-0.0108**	0.0063	0.0026	0.0156***	-0.0043
		(0.0033)	(0.0039)	(0.0038)	(0.0040)	(0.0033)	(0.0034)	(0.0042)	(0.0046)	(0.0044)	(0.0047)	(0.0039)
CDS Introduction	0.0123**	0.0133**	0.0149***	0.0109*	0.0116**	0.0111**	0.0158***	0.0129**	0.0228***	0.0154***	0.0123**	0.0152***
	(0.0056)	(0.0057)	(0.0057)	(0.0057)	(0.0056)	(0.0056)	(0.0057)	(0.0057)	(0.0063)	(0.0060)	(0.0055)	(0.0059)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686
Adj. R-Squared	0.188	0.188	0.191	0.188	0.191	0.190	0.194	0.194	0.196	0.189	0.193	0.189

Table 5: Effects of CDS on Capital Investment

The table shows the average treatment effect of CDS introductions on the capital investment (defined as capital expenditures divided by total assets) of the treated (ATET) using overlap weights (Li, Morgan, and Zaslavsky, 2017). The treatment is the introduction of CDS (i.e., only the first year of CDS trading year for each firm). The regressions further include its interaction effects with lagged (standardized) country characteristics, as well as the lagged country variables themselves. The use of overlap weights ensures that covariates are perfectly balanced between treated firms and control firms in the year before treatment, as shown in Appendix E. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). All regressions include year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0027*	0.0054***	0.0031	-0.0013	0.0015	-0.0005	0.0001	-0.0048*	-0.0050**	-0.0035	0.0022
		(0.0016)	(0.0020)	(0.0019)	(0.0016)	(0.0018)	(0.0019)	(0.0024)	(0.0028)	(0.0022)	(0.0026)	(0.0019)
Country Variable		-0.0004	-0.0007	-0.0015	0.0005	0.0007	-0.0036***	-0.0022*	-0.0042**	-0.0018	-0.0033**	0.0023*
		(0.0010)	(0.0012)	(0.0011)	(0.0012)	(0.0010)	(0.0012)	(0.0013)	(0.0017)	(0.0014)	(0.0016)	(0.0012)
CDS Introduction	0.0013	0.0019	0.0022	0.0021	0.0012	0.0012	0.0014	0.0013	0.0030	0.0028	0.0013	0.0019
	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0016)	(0.0017)	(0.0017)	(0.0017)	(0.0021)	(0.0019)	(0.0016)	(0.0018)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005
Adj. R-Squared	0.263	0.264	0.266	0.264	0.263	0.264	0.268	0.264	0.275	0.271	0.271	0.267

Table 6: Effects of CDS on R&D Share

The table shows the average treatment effect of CDS introductions on the R&D share (defined as R&D divided by the sum of R&D and capital expenditures) of the treated (ATET) using overlap weights (Li, Morgan, and Zaslavsky, 2017). The treatment is the introduction of CDS (i.e., only the first year of CDS trading year for each firm). The regressions further include its interaction effects with lagged (standardized) country characteristics, as well as the lagged country variables themselves. The use of overlap weights ensures that covariates are perfectly balanced between treated firms and control firms in the year before treatment, as shown in Appendix E. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). All regressions include year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0040	-0.0144**	0.0062	0.0169***	-0.0088*	0.0035	-0.0028	0.0235***	0.0173***	0.0171**	-0.0047
		(0.0056)	(0.0063)	(0.0066)	(0.0064)	(0.0051)	(0.0054)	(0.0076)	(0.0076)	(0.0065)	(0.0067)	(0.0055)
Country Variable		-0.0117***	-0.0271***	-0.0238***	0.0035	0.0169***	0.0157***	0.0142***	0.0319***	0.0345***	0.0366***	-0.0292***
		(0.0039)	(0.0039)	(0.0044)	(0.0042)	(0.0030)	(0.0027)	(0.0037)	(0.0039)	(0.0036)	(0.0036)	(0.0036)
CDS Introduction	-0.0115*	-0.0106*	-0.0140**	-0.0099	-0.0094	-0.0108*	-0.0122*	-0.0113*	-0.0195***	-0.0167***	-0.0115*	-0.0128**
	(0.0064)	(0.0064)	(0.0062)	(0.0063)	(0.0064)	(0.0063)	(0.0064)	(0.0064)	(0.0066)	(0.0063)	(0.0061)	(0.0061)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005
Adj. R-Squared	0.518	0.519	0.533	0.523	0.521	0.520	0.522	0.520	0.537	0.544	0.542	0.531

Table 7: Effects of CDS on Risk

The table shows the average treatment effect of CDS introductions on the idiosyncratic risk (in local currency) of the treated (ATET) using overlap weights (Li, Morgan, and Zaslavsky, 2017). The treatment is the introduction of CDS (i.e., only the first year of CDS trading year for each firm). The regressions further include its interaction effects with lagged (standardized) country characteristics, as well as the lagged country variables themselves. The use of overlap weights ensures that covariates are perfectly balanced between treated firms and control firms in the year before treatment, as shown in Appendix E. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). All regressions include year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0024	0.0532***	-0.0009	-0.0188	-0.0197	-0.0343***	0.0108	-0.0506***	-0.0358***	-0.0386***	0.0577***
		(0.0128)	(0.0128)	(0.0148)	(0.0117)	(0.0136)	(0.0132)	(0.0162)	(0.0143)	(0.0132)	(0.0143)	(0.0130)
Country Variable		-0.0107	-0.0171**	0.0000	-0.0200***	0.0210***	-0.0096	-0.0464***	-0.0486***	-0.0131*	-0.0420***	-0.0200***
		(0.0071)	(0.0074)	(0.0083)	(0.0071)	(0.0070)	(0.0069)	(0.0080)	(0.0088)	(0.0076)	(0.0088)	(0.0074)
CDS Introduction	-0.0070	-0.0065	0.0021	-0.0073	-0.0095	-0.0054	-0.0006	-0.0078	0.0102	0.0038	-0.0071	0.0090
	(0.0118)	(0.0120)	(0.0117)	(0.0126)	(0.0117)	(0.0118)	(0.0121)	(0.0118)	(0.0127)	(0.0128)	(0.0116)	(0.0126)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610
Adj. R-sq	0.271	0.272	0.275	0.271	0.278	0.272	0.277	0.280	0.296	0.279	0.291	0.277

Table 8: Robustness Tests

The table shows the average treatment effect of CDS introductions on the market leverage (Panel A), capital investment (Panel B), R&D share (Panel C) and idiosyncratic risk (in local currency) (Panel D) of the treated (ATET) using overlap weights (Li, Morgan, and Zaslavsky, 2017). Market leverage is defined as the sum of total debt and preferred stock divided by market value of total asset; capital investment is defined as capital expenditures divided by total assets; R&D share is defined as R&D divided by the sum of R&D and capital expenditures. The treatment is the introduction of CDS (i.e., only the first year of CDS trading year for each firm). The regressions further include its interaction effects with lagged (standardized) country characteristics, as well as the lagged country variables themselves and lagged firm characteristics. The use of overlap weights ensures that covariates are perfectly balanced between treated firms and control firms in the year before treatment, as shown in Appendix E. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). The lagged firm characteristics in Panel A are *Debt Maturity*, *Market/Book*, *PPE/Size*, *Cash Flow/Sales*, *Cash and Short-term Investments/Total Assets (log)*, *Total Assets in USD (log)*, *ROA Volatility (log)*, *Tax Rate*, and *Leverage Market Value (Industry Median)*. The lagged firm characteristics in Panels B and C are *Market/Book*, *Return On Assets (3y)*, and *PPE/Size*. The lagged firm characteristics in Panel D are *Market/Book*, *Leverage Market Value*, and *Total Assets in USD (log)*. All regressions also include year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

Panel A: Effects of CDS on Leverage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0061	0.0168***	0.0003	-0.0041	0.0090	-0.0145***	-0.0074	-0.0293***	-0.0140**	-0.0253***	0.0121**
		(0.0049)	(0.0060)	(0.0058)	(0.0051)	(0.0064)	(0.0055)	(0.0067)	(0.0068)	(0.0064)	(0.0071)	(0.0060)
Country Variable		-0.0039	-0.0065*	-0.0044	0.0065*	-0.0119***	-0.0016	-0.0125***	0.0023	-0.0004	0.0101**	0.0001
		(0.0028)	(0.0034)	(0.0034)	(0.0037)	(0.0032)	(0.0029)	(0.0036)	(0.0039)	(0.0039)	(0.0040)	(0.0037)
CDS Introduction	0.0127**	0.0141***	0.0156***	0.0128**	0.0122**	0.0119**	0.0153***	0.0132***	0.0227***	0.0169***	0.0127**	0.0160***
	(0.0050)	(0.0051)	(0.0051)	(0.0052)	(0.0051)	(0.0051)	(0.0052)	(0.0051)	(0.0056)	(0.0054)	(0.0050)	(0.0054)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686	79,686
Adj. R-Squared	0.343	0.343	0.345	0.343	0.344	0.345	0.347	0.349	0.351	0.346	0.347	0.345

(continued)

Table 8: Robustness Tests (continued)

Panel B: Effects of CDS on Capital Investment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0018	0.0043**	0.0023	-0.0013	0.0004	-0.0008	-0.0008	-0.0049*	-0.0057***	-0.0048**	0.0030*
		(0.0016)	(0.0019)	(0.0018)	(0.0015)	(0.0017)	(0.0019)	(0.0023)	(0.0026)	(0.0021)	(0.0024)	(0.0018)
Country Variable		-0.0014	-0.0014	-0.0038***	0.0002	0.0014	-0.0015	-0.0008	-0.0017	0.0010	-0.0004	-0.0003
		(0.0009)	(0.0012)	(0.0010)	(0.0010)	(0.0009)	(0.0011)	(0.0012)	(0.0016)	(0.0013)	(0.0015)	(0.0011)
CDS Introduction	0.0013	0.0017	0.0021	0.0019	0.0012	0.0013	0.0015	0.0014	0.0030	0.0030*	0.0013	0.0021
	(0.0015)	(0.0016)	(0.0016)	(0.0016)	(0.0015)	(0.0015)	(0.0016)	(0.0016)	(0.0020)	(0.0018)	(0.0015)	(0.0017)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005
Adj. R-Squared	0.336	0.336	0.338	0.338	0.336	0.337	0.337	0.336	0.341	0.340	0.340	0.337

(continued)

Table 8: Robustness Tests (continued)

Panel C: Effects of CDS on R&D Share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0053	-0.0134**	0.0074	0.0152**	-0.0040	0.0045	0.0006	0.0236***	0.0205***	0.0209***	-0.0076
		(0.0056)	(0.0061)	(0.0066)	(0.0062)	(0.0052)	(0.0053)	(0.0073)	(0.0075)	(0.0064)	(0.0068)	(0.0055)
Country Variable		-0.0081**	-0.0258***	-0.0165***	0.0059	0.0147***	0.0088***	0.0105***	0.0257***	0.0275***	0.0302***	-0.0215***
		(0.0037)	(0.0038)	(0.0042)	(0.0041)	(0.0027)	(0.0026)	(0.0035)	(0.0041)	(0.0036)	(0.0038)	(0.0036)
CDS Introduction	-0.0115*	-0.0103*	-0.0138**	-0.0096	-0.0096	-0.0112*	-0.0123**	-0.0116*	-0.0195***	-0.0177***	-0.0115*	-0.0136**
	(0.0062)	(0.0062)	(0.0060)	(0.0061)	(0.0062)	(0.0061)	(0.0062)	(0.0062)	(0.0065)	(0.0061)	(0.0060)	(0.0060)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005	80,005
Adj. R-Squared	0.543	0.544	0.557	0.546	0.547	0.546	0.545	0.545	0.558	0.563	0.562	0.552

(continued)

Table 8: Robustness Tests (continued)

Panel D: Effects of CDS on Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		-0.0058	0.0302**	0.0032	-0.0196*	-0.0259*	-0.0124	0.0358**	-0.0113	-0.0123	-0.0073	0.0430***
		(0.0122)	(0.0122)	(0.0140)	(0.0112)	(0.0139)	(0.0127)	(0.0155)	(0.0141)	(0.0126)	(0.0135)	(0.0123)
Country Variable		0.0003	-0.0079	0.0127	-0.0102	0.0136**	-0.0157**	-0.0494***	-0.0491***	-0.0204***	-0.0437***	-0.0100
		(0.0067)	(0.0073)	(0.0080)	(0.0070)	(0.0068)	(0.0067)	(0.0074)	(0.0080)	(0.0073)	(0.0083)	(0.0071)
CDS Introduction	-0.0069	-0.0083	-0.0018	-0.0060	-0.0095	-0.0047	-0.0046	-0.0094	-0.0031	-0.0032	-0.0069	0.0050
	(0.0112)	(0.0114)	(0.0111)	(0.0120)	(0.0112)	(0.0114)	(0.0115)	(0.0112)	(0.0120)	(0.0120)	(0.0112)	(0.0118)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610	79,610
Adj. R-Squared	0.331	0.331	0.332	0.332	0.334	0.332	0.334	0.338	0.343	0.335	0.341	0.334

Appendix A: CDS Contracts and the Local Legal Environment

The ISDA Master Agreement and its annexures for CDS contracts standardize definitions and language in order to create a more homogeneous and liquid product, and reduce basis risk and transactions costs. Nevertheless, the specific local legal environment in which a reference entity is headquartered is important for the CDS contract; in effect, the laws to which the reference entity is subject must be 'mapped' to the language used in the CDS contract. Below are two specific examples in recent cases where an analysis of local law was required, in order to determine whether a credit event had occurred.

A. Abengoa

Abengoa, a Spanish conglomerate, filed for insolvency relief under a provision of Spanish law in November 2015. The regional Determination Committee, in considering whether a credit event had occurred, sought an analysis of whether the specific provision that Abengoa had triggered (Article 5bis) was relief that was similar to "a judgment of insolvency or bankruptcy", as the 2014 ISDA Definitions of Credit Events required. In its analysis, the DC noted that Article 5bis provided relief for only certain Abengoa assets, was quite time-limited, and suspended enforcement of claims but did not suspend payment obligations. On the basis of this analysis of a specific provision of Spanish insolvency law, the DC determined that no credit events had occurred.[21]

B. Portugal Telecom

In late 2013, Portugal Telecom and a Brazilian telecommunications company, Oi, announced a merger that was completed in 2014. Portugal Telecom had a financing subsidiary, PTIF, which was a reference entity for CDS in Europe. In June 2015, Oi sold Portugal Telecom but retained PTIF. In June 2016, Oi and its subsidiaries filed for reorganization under Brazilian law. The Determination Committee considered elements of reorganization law in Brazil in order to assess whether this filing constituted a credit event. They concluded that specific elements of the law, including an Automatic Stay (allowing the firm relief from its creditors), payment relief during reorganization (combined with the fact that reorganization would take a considerable period of time), and elements of the debt restructuring that were allowed under the reorganization, were similar to a judgment of insolvency or bankruptcy. As a consequence, the DC ruled that a credit event had occurred.

[21] Shortly after this episode (in December 2015), a Failure to Pay event for Abengoa did occur, and CDS were triggered.

Appendix B: Derivation of Proposition 1

For $\gamma N \geq q\lambda C_2^H$ and/or $N \geq q\lambda C_2^L$, where $\tilde{F}_C^i \geq F_C^i$ for $\forall i = L,H$, we define the firm's net improvement in its debt value due to CDS as $\Delta B \equiv B_{CDS} - B$. As CDS are written on the existing debt obligations, we consider only the case where debt financing is feasible in the absence of CDS ($B>0$). Hence, we focus on the case $F \leq F_C^H \equiv \overline{F}$.

When the outstanding CDS notional is not excessive $(N \leq \lambda C_2^L)$, the increase in debt value with CDS, ΔB, is given as

$$\begin{cases} (1-\theta)\left[\phi max(\gamma N - q\lambda C_2^H, 0) + (1-\phi)(N - q\lambda C_2^L)\right] & \text{if } F \leq F_C^L \\ \theta(1-\phi)\left(F - q\lambda C_2^L\right) + (1-\theta)\left[\phi max(\gamma N - q\lambda C_2^H, 0) + (1-\phi)(N - q\lambda C_2^L)\right] & \text{if } F \in (F_C^L, \tilde{F}_C^L] \\ \theta(1-\phi)\left(N - q\lambda C_2^L\right) + (1-\theta)\left[\phi max(\gamma N - q\lambda C_2^H, 0) + (1-\phi)(N - q\lambda C_2^L)\right] & \text{if } F > \tilde{F}_C^L \end{cases} \quad \text{(B.1)}$$

This, in turn, implies the following comparative statics:

$$\frac{\partial \Delta B}{\partial \gamma} = (1-\theta)\phi N 1_{\gamma N > q\lambda C_2^H} \quad \text{(B.2)}$$

$$\frac{\partial \Delta B}{\partial \lambda} = \begin{cases} -(1-\theta) q\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F \leq F_C^L \\ -\theta(1-\phi) q C_2^L - (1-\theta) q\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F > F_C^L \end{cases} \quad \text{(B.3)}$$

$$\frac{\partial \Delta B}{\partial q} = \begin{cases} -(1-\theta) \lambda\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F \leq F_C^L \\ -\theta(1-\phi) \lambda C_2^L - (1-\theta) \lambda\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F > F_C^L \end{cases} \quad \text{(B.4)}$$

For the case where there is excessive CDS notional, $N > \lambda C_2^L$, which causes the "empty creditor" problem, ΔB is given as

$$\begin{cases} (1-\theta)\left[\phi max(\gamma N - q\lambda C_2^H, 0) + (1-\phi)(S - q\lambda C_2^L)\right] & \text{if } F \leq F_C^L \\ \theta(1-\phi)\left(F - q\lambda C_2^L\right) + (1-\theta)\left[\phi max(\gamma N - q\lambda C_2^H, 0) + (1-\phi)(S - q\lambda C_2^L)\right] & \text{if } F \in (F_C^L, \tilde{F}_C^L] \\ \theta(1-\phi)\left(S - q\lambda C_2^L\right) + (1-\theta)\left[\phi max(\gamma N - q\lambda C_2^H, 0) + (1-\phi)(S - q\lambda C_2^L)\right] & \text{if } F > \tilde{F}_C^L \end{cases} \quad \text{(B.5)}$$

The comparative statics, in this case, are as follows:

$$\frac{\partial \Delta B}{\partial \gamma} = (1-\theta)\phi N 1_{\gamma N > q\lambda C_2^H} \tag{B.6}$$

$$\frac{\partial \Delta B}{\partial S} = \begin{cases} (1-\theta)(1-\phi) & \text{if } F \le F_C^L \\ (1-\phi) & \text{if } F > F_C^L \end{cases} \tag{B.7}$$

$$\frac{\partial \Delta B}{\partial \lambda} = \begin{cases} -(1-\theta) q\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F \le F_C^L \\ -\theta(1-\phi) q C_2^L - (1-\theta) q\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F > F_C^L \end{cases} \tag{B.8}$$

$$\frac{\partial \Delta B}{\partial q} = \begin{cases} -(1-\theta) \lambda\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F \le F_C^L \\ -\theta(1-\phi) \lambda C_2^L - (1-\theta) \lambda\left[\phi C_2^H 1_{\gamma N > q\lambda C_2^H} + (1-\phi) C_2^L\right] & \text{if } F > F_C^L \end{cases} \tag{B.9}$$

It follows that $\left(\frac{\partial \Delta B}{\partial \gamma} \ge 0\right)$, $\left(\frac{\partial \Delta B}{\partial S} > 0\right)$, $\left(\frac{\partial \Delta B}{\partial \lambda} < 0\right)$, and $\left(\frac{\partial \Delta B}{\partial q} < 0\right)$.■

Appendix C: Variable Definitions

The table shows the definitions of the main firm and country characteristics used in the study.

Variable Name	Definition
Firm Characteristics	
Cash Flow/Sales	Cash Flow/Sales
Convertible Debt/Size	Convertible Debt / SizeMarketValue
Debt Maturity	[LongTermDebt (due more than 1 year) + PreferredStock] / TotalDebtAndPreferredStock
Dividend	Dummy variable with value 1 if a dividend was paid; 0 otherwise
Free Cash Flow/Total Assets	(FundsFromOperations - CapitalExpendituresAdditi - CashDividendsPaidTotal) / TotalAssets
Gross Profit Margin (3y)	Average of up to 3 years of GrossProfitMargin
Leverage Market Value	TotalDebtAndPreferredStock / TotalAssetsMarketValue
Leverage Market Value (Industry Median)	TotalDebtAndPreferredStock / TotalAssetsMarketValue, Industry median
Age (log)	log (Age)
ROA Volatility (log)	Natural Logarithm of ROAVolatility
Total Assets in USD (log)	Natural Logarithm of TotalAssetsUSD
Market/Book	MarketValue/(CommonEquity + DeferredTaxes)
Net FX-Exposure	Foreign Sales - Foreign Assets (missing values set to zero)
PPE (Net)/Size	PPENet / SizeMarketValue
Return On Assets (3y)	Average of up to 3 years of ReturnOnAssets
Tax Rate	Tax Rate
Tobin's Q	SizeMarketValue / TotalAssets
Return Volatility in LC (log)	Natural logarithm of volatility of weekly stock returns in local currency
Return Volatility in USD (log)	Natural logarithm of volatility of weekly stock returns in USD
Capital Expenditures/Total Assets	CapitalExpendituresAdditi / TotalAssets, with missing values set to zero
R&D/Total Assets	ResearchDevelopment / TotalAssets, with missing values set to zero
Cash and Short-term Investments/Total Assets (log)	Natural logarithm of CashAndSTInvToTA_tru
R&D Share	R&D/(R&D + Capital Expenditures), with R&D Share set to zero if R&D and Capital Expenditures are both 0.
Idiosyncratic Risk in LC (log)	Natural Logarithm of the annualized volatility of the residual from a regression of weekly stock returns in local currency on local and global market index returns
Country Characteristics	
Creditor Rights	Creditor Rights Aggregate Score (from La Porta et al., 1998)
Restrictions on Entry	Restrictions on the borrower entering reorganization without the creditors' consent (from La Porta et al., 1998)
No Automatic Stay on Assets	No automatic stay or asset freeze to protect the firm from creditors (from La Porta et al., 1998)
Management Does Not Stay	Restrictions on current management administering the assets while in reorganization (from La Porta et al., 1998)
Secured Creditors First	Priority of secured creditors in payments resulting from liquidation (from La Porta et al., 1998)
Law&Order	A measure of the strength and impartiality of the legal system as well as popular observance of the law (PRS Group, 2015)
Corruption	A measure of corruption within the political system that can threaten foreign investment (PRS Group, 2015)
Political Risk	Measures political stability within the country using a variety of measures (PRS Group, 2015)
Domestic Credit to Private Sector	Private credit from banks to GDP (World Bank, 2016)
Private Credit	Total credit in the non-financial sector to GDP (BIS, 2015)
Ownership Concentration	Average percentage of common shares owned by the three largest shareholders in the 10 largest nonfinancial, privately owned domestic firms in a given country (La Porta et al., 1998)

Appendix D: Summary Statistics of Variables

The table shows summary statistics of the main variables used in the study. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						Percentiles		
	Observations	Mean	Std. Dev.	Minimum	p25	p50	p75	Maximum
Firm Characteristics								
Cash Flow/Sales	380,555	-0.14	0.78	-3.11	0.01	0.07	0.14	0.38
Convertible Debt/Size	260,840	0.00	0.01	0.00	0.00	0.00	0.00	0.05
Debt Maturity	342,920	0.50	0.36	0.00	0.14	0.53	0.84	1.00
Dividend	416,784	0.48	0.50	0.00	0.00	0.00	1.00	1.00
Free Cash Flow/Total Assets	409,355	-0.07	0.23	-0.84	-0.09	0.00	0.05	0.15
Gross Profit Margin (3y)	386,086	0.20	0.33	-0.87	0.11	0.22	0.38	0.69
Leverage Market Value	344,268	0.18	0.18	0.00	0.01	0.13	0.30	0.56
Leverage Market Value (Industry Median)	416,784	0.13	0.08	0.00	0.05	0.13	0.19	0.28
Age (log)	416,752	2.03	1.08	0.00	1.39	2.30	2.83	3.95
ROA Volatility (log)	293,866	-3.00	1.27	-5.07	-3.95	-3.13	-2.15	-0.41
Total Assets in USD (log)	416,760	18.27	2.24	13.76	16.83	18.32	19.83	22.31
Market/Book	343,708	2.17	2.26	0.27	0.72	1.33	2.60	9.14
Net FX-Exposure	416,784	0.08	0.22	-0.74	0.00	0.00	0.01	0.98
PPE (Net)/Size	368,729	0.37	0.37	0.00	0.06	0.25	0.58	1.27
Return On Assets (3y)	375,617	-0.06	0.27	-0.94	-0.05	0.03	0.08	0.19
Tax Rate	242,250	0.29	0.17	0.00	0.18	0.29	0.39	0.66
Tobin's Q	371,913	1.59	1.74	0.31	0.61	0.93	1.67	7.40
Return Volatility in LC (log)	364,728	-0.71	0.60	-1.71	-1.16	-0.75	-0.30	0.47
Return Volatility in USD (log)	361,711	-0.67	0.59	-1.65	-1.11	-0.71	-0.26	0.50
Capital Expenditures/Total Assets	416,784	0.05	0.06	0.00	0.01	0.03	0.07	0.21
R&D/Total Assets	416,784	0.02	0.04	0.00	0.00	0.00	0.01	0.15
Cash and Short-term Investments/Total Assets (log)	413,586	-2.25	1.54	-5.56	-3.23	-2.10	-1.09	0.00
R&D Share	4167,84	0.15	0.28	0.00	0.00	0.00	0.13	1.00
Idiosyncratic Risk in LC (log)	360,292	-0.82	0.63	-1.89	-1.30	-0.87	-0.39	0.42
Country Characteristics								
Creditor Rights	415,811	2.00	1.02	0.00	1.00	2.00	3.00	4.00
Restrictions on Entry	415,811	0.25	0.44	0.00	0.00	0.00	1.00	1.00
No Automatic Stay on Assets	415,811	0.32	0.47	0.00	0.00	0.00	1.00	1.00
Management Does Not Stay	415,811	0.53	0.50	0.00	0.00	1.00	1.00	1.00
Secured Creditors First	415,811	0.90	0.31	0.00	1.00	1.00	1.00	1.00
Law&Order	415,905	4.85	0.88	1.00	5.00	5.00	5.00	6.00
Corruption	415,905	3.69	1.01	1.00	3.00	4.00	4.50	6.00
Political Risk	415,905	78.48	8.64	44.00	76.50	80.50	84.00	97.00
Domestic Credit to Private Sector	393,829	133.80	53.88	8.77	96.44	137.10	182.40	233.70
Private Credit	378,638	146.30	48.16	16.80	130.30	157.30	175.00	462.10
Ownership Concentration	400,491	0.32	0.15	0.18	0.20	0.23	0.41	0.67

Appendix E: Firm and Country Level Characteristics With Imposing Overlap-Weights

The table compares firm and country level characteristics between firm-years with CDS introductions (Treated) and without CDS introductions (Control) in the prior year. In particular, it shows the mean and standard errors for treated and control firms, and the percentage bias according to Rosenbaum and Rubin (1985). The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit. The sample is limited to firm-year observations with all the reported firm and country level variables being jointly available. Observations are weighted using overlap weights (Li, Morgan, and Zaslavsky, 2017).

	Treated (N=782)		Control (N=79,223)		
	Mean	Std. Err.	Mean	Std. Err.	% Bias
Firm Characteristics					
Cash Flow/Sales	0.149	0.004	0.149	0.002	0%
Convertible Debt/Size	0.010	0.001	0.010	0.000	0%
Debt Maturity	0.752	0.009	0.752	0.003	0%
Dividend	0.835	0.014	0.835	0.005	0%
Free Cash Flow/Total Assets	0.024	0.002	0.024	0.001	0%
Gross Profit Margin (3y)	0.306	0.006	0.306	0.003	0%
Leverage Market Value	0.239	0.005	0.239	0.003	0%
Leverage Market Value (Industry Median)	0.165	0.003	0.165	0.001	0%
Age (log)	2.763	0.029	2.763	0.011	0%
ROA Volatility (log)	-3.881	0.032	-3.881	0.013	0%
Total Assets in USD (log)	21.715	0.025	21.715	0.007	0%
Market/Book	2.447	0.069	2.447	0.032	0%
Net FX-Exposure	0.122	0.009	0.122	0.003	0%
PPE (Net)/Size	0.394	0.011	0.394	0.004	0%
Return On Assets (3y)	0.063	0.002	0.063	0.001	0%
Tax Rate	0.339	0.005	0.339	0.002	0%
Tobin's Q	1.302	0.032	1.302	0.014	0%
Return Volatility in LC (log)	-1.141	0.013	-1.141	0.005	0%
Return Volatility in USD (log)	-1.101	0.014	-1.101	0.005	0%
Capital Expenditures/Total Assets	0.060	0.002	0.060	0.001	0%
R&D/Total Assets	0.013	0.001	0.013	0.000	0%
Cash and Short-term Investments/Total Assets (log)	-2.681	0.047	-2.681	0.019	0%
Country Characteristics					
Restrictions on Entry	-0.171	0.033	-0.171	0.012	0%
No Automatic Stay on Assets	-0.263	0.032	-0.263	0.011	0%
Management Does Not Stay	-0.126	0.036	-0.126	0.015	0%
Secured Creditors First	0.083	0.033	0.083	0.010	0%
Law&Order	0.182	0.036	0.182	0.016	0%
Corruption	0.069	0.030	0.069	0.013	0%
Political Risk	0.340	0.031	0.340	0.012	0%
Domestic Credit to Private Sector	0.299	0.035	0.299	0.012	0%
Private Credit	-0.002	0.032	-0.002	0.012	0%
Ownership Concentration	-0.275	0.036	-0.275	0.012	0%

Appendix F: OLS Regressions of CDS Effects

The table shows the results from OLS regressions of market leverage (Panel A), capital investment (Panel B), R&D share (Panel C) and idiosyncratic risk (in local currency) (Panel D) on CDS introductions (i.e., only the first year of CDS trading year for each firm), their interaction effects with lagged (standardized) country characteristics, as well as the lagged country variables themselves and lagged firm characteristics. Market leverage is defined as the sum of total debt and preferred stock divided by market value of total asset; capital investment is defined as capital expenditures divided by total assets; R&D share is defined as R&D divided by the sum of R&D and capital expenditures. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). The lagged firm characteristics in Panel A are *Debt Maturity*, *Market/Book*, *PPE/Size*, *Cash Flow/Sales*, *Cash and Short-term Investments/Total Assets (log)*, *Total Assets in USD (log)*, *ROA Volatility (log)*, *Tax Rate*, and *Leverage Market Value (Industry Median)*. The lagged firm characteristics in Panels B and C are *Market/Book*, *Return On Assets (3y)*, and *PPE/Size*. The lagged firm characteristics in Panel D are *Market/Book*, *Leverage Market Value*, and *Total Assets in USD (log)*. All regressions also include year and Fama-French 48 industry fixed effects, and the standard errors are clustered at the firm level. Standard errors are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample consists of an unbalanced panel of more than non-financial 56,000 firms across 50 countries over the period 2001-2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

Panel A: Effects of CDS on Leverage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x		0.0054	0.0129**	-0.0002	0.0052	-0.0083	-0.0162***	-0.0176***	-0.0191***	-0.0129**	-0.0117*	0.0113**
Country Variable		(0.0046)	(0.0055)	(0.0054)	(0.0046)	(0.0058)	(0.0047)	(0.0058)	(0.0059)	(0.0054)	(0.0061)	(0.0050)
Country Variable		0.0050***	0.0034***	0.0022**	0.0067***	-0.0020*	-0.0068***	-0.0133***	-0.0075***	-0.0064***	-0.0019*	0.0067***
		(0.0010)	(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0010)
CDS Introduction	0.0357***	0.0375***	0.0386***	0.0361***	0.0371***	0.0370***	0.0391***	0.0364***	0.0422***	0.0406***	0.0356***	0.0404***
	(0.0048)	(0.0049)	(0.0049)	(0.0050)	(0.0048)	(0.0049)	(0.0049)	(0.0048)	(0.0053)	(0.0051)	(0.0048)	(0.0051)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	107,346	107,346	107,346	107,346	107,346	107,346	107,346	107,346	107,346	107,346	107,346	107,346
Adj. R-Squared	0.227	0.228	0.228	0.227	0.229	0.227	0.229	0.233	0.229	0.229	0.227	0.229

(continued)

Appendix F: OLS Regressions of CDS Effects (continued)

Panel B: Effects of CDS on Capital Investment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x		0.0024*	0.0061***	0.0004	0.0008	-0.0005	-0.0056***	-0.0059***	-0.0084***	-0.0046***	-0.0063***	0.0041***
Country Variable		(0.0013)	(0.0018)	(0.0015)	(0.0012)	(0.0015)	(0.0016)	(0.0020)	(0.0022)	(0.0017)	(0.0020)	(0.0015)
Country Variable		-0.0002	0.0004*	0.0004*	-0.0018***	0.0015***	0.0003	0.0004**	-0.0017***	-0.0034***	-0.0027***	0.0013***
		(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
CDS Introduction	0.0037***	0.0044***	0.0052***	0.0040***	0.0036***	0.0036***	0.0051***	0.0044***	0.0073***	0.0066***	0.0044***	0.0057***
	(0.0013)	(0.0013)	(0.0014)	(0.0013)	(0.0013)	(0.0013)	(0.0014)	(0.0013)	(0.0017)	(0.0015)	(0.0013)	(0.0014)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375
Adj. R-Squared	0.176	0.176	0.176	0.176	0.177	0.177	0.176	0.176	0.177	0.179	0.178	0.177

(continued)

Appendix F: OLS Regressions of CDS Effects (continued)

Panel C: Effects of CDS on R&D Share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x		0.0165***	-0.0091*	0.0061	0.0211***	0.0005	-0.0119***	-0.0185***	0.0143***	-0.0064	0.0169***	0.0081*
Country Variable		(0.0047)	(0.0047)	(0.0051)	(0.0054)	(0.0043)	(0.0040)	(0.0058)	(0.0054)	(0.0049)	(0.0051)	(0.0045)
Country Variable		-0.0247***	-0.0379***	-0.0297***	0.0003	0.0200***	0.0348***	0.0290***	0.0417***	0.0610***	0.0389***	-0.0541***
		(0.0013)	(0.0012)	(0.0012)	(0.0013)	(0.0012)	(0.0009)	(0.0011)	(0.0010)	(0.0013)	(0.0011)	(0.0012)
CDS Introduction	0.0333***	0.0306***	0.0225***	0.0245***	0.0369***	0.0306***	0.0283***	0.0311***	0.0193***	0.0125**	0.0257***	0.0131***
	(0.0054)	(0.0053)	(0.0051)	(0.0051)	(0.0054)	(0.0053)	(0.0053)	(0.0055)	(0.0053)	(0.0050)	(0.0052)	(0.0050)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375	236,375
Adj. R-Squared	0.277	0.285	0.294	0.288	0.277	0.281	0.290	0.285	0.294	0.313	0.292	0.310

(continued)

Appendix F: OLS Regressions of CDS Effects (continued)

Panel D: Effects of CDS on Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x		0.0082	0.0262**	0.0137	0.0033	-0.0242	-0.0248**	-0.0076	-0.0476***	-0.0486***	-0.0452***	0.0268**
Country Variable		(0.0116)	(0.0111)	(0.0129)	(0.0103)	(0.0148)	(0.0123)	(0.0130)	(0.0127)	(0.0116)	(0.0126)	(0.0119)
Country Variable		-0.0220***	-0.0198***	0.0006	-0.0410***	0.0215***	0.0244***	0.0167***	0.0104***	0.0259***	0.0114***	-0.0121***
		(0.0020)	(0.0020)	(0.0019)	(0.0019)	(0.0021)	(0.0020)	(0.0021)	(0.0020)	(0.0021)	(0.0020)	(0.0021)
CDS Introduction	0.0395***	0.0377***	0.0432***	0.0436***	0.0316***	0.0377***	0.0410***	0.0383***	0.0570***	0.0524***	0.0406***	0.0449***
	(0.0109)	(0.0110)	(0.0109)	(0.0116)	(0.0107)	(0.0112)	(0.0112)	(0.0109)	(0.0119)	(0.0118)	(0.0109)	(0.0117)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	247,351	247,351	247,351	247,351	247,351	247,351	247,351	247,351	247,351	247,351	247,351	247,351
Adj. R-Squared	0.409	0.410	0.410	0.409	0.413	0.410	0.410	0.409	0.409	0.410	0.409	0.409

Appendix G: Results Excluding U.S. Firms

This appendix reports the average treatment effect of CDS introduction for non-U.S. firms on market leverage ratio (Panel A), capital investment to assets ratio (Panel B), R&D share (Panel C), and log stock return volatility in local currency (Panel D) using overlap weights (Li, Morgan, and Zaslavsky, 2017). Market leverage is defined as the sum of total debt and preferred stock divided by market value of total asset; capital investment is defined as capital expenditures divided by total assets; R&D share is defined as R&D divided by the sum of R&D and capital expenditures. Country variables are in four categories: (1) creditor rights, (2) property rights, (3) private credit availability, and (4) equity ownership concentration. For the credit rights, we use an aggregate index (*Creditor Rights*) as well as its four subindices, namely restrictions on a debtor entering reorganization without creditors' consent (*Restriction on Entry*), no "automatic stay" or "asset freeze" (*No Automatic Stay*), management does not retain administration of its property pending the resolution of the reorganization (*Management Does Not Stay*), and secured creditors are being paid first out of the proceeds of liquidating a bankrupt firm as opposed to other creditors such as government or workers (*Secured Creditors First*). For property rights, we consider the following three measures: *Law&Order*, *Corruption*, and *Political Risk*, where higher index values indicate stronger protection on private properties. Private credit availability is measured by total credit to the private non-financial sector scaled by GDP (*Private Credit*), and domestic credit by financial corporations to the private sector scaled by GDP (*Domestic Credit to Private Sector*). Year and Fama-French 48 industry fixed effects are controlled for in all columns. Standard errors are clustered at the firm level, and they are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1%-statistical significance, respectively. The sample period is from 2001 to 2015. Market data are from DataStream, accounting data are from WorldScope, and CDS data are from Markit.

Panel A: Effects of CDS on Leverage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0097	0.0208***	-0.0026	-0.0091	0.0153**	-0.0176***	-0.0078	-0.0291***	-0.0174**	-0.0292***	0.0138**
		(0.0069)	(0.0071)	(0.0071)	(0.0086)	(0.0066)	(0.0064)	(0.0080)	(0.0078)	(0.0075)	(0.0074)	(0.0068)
Country Variable		-0.0152***	-0.0225***	-0.0064	0.0013	-0.0089**	0.0021	-0.0094**	0.0040	0.0071	0.0118**	-0.0079*
		(0.0039)	(0.0043)	(0.0044)	(0.0052)	(0.0035)	(0.0037)	(0.0042)	(0.0048)	(0.0051)	(0.0048)	(0.0044)
CDS Introduction	0.0136*	0.0122*	0.0126*	0.0136*	0.0173**	0.0145**	0.0126*	0.0124*	0.0220***	0.0137*	0.0131*	0.0132*
	(0.0071)	(0.0073)	(0.0070)	(0.0071)	(0.0082)	(0.0071)	(0.0070)	(0.0071)	(0.0076)	(0.0071)	(0.0070)	(0.0071)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	65,132	65,132	65,132	65,132	65,132	65,132	65,132	65,132	65,132	65,132	65,132	65,132
Adj. R-Squared	0.207	0.212	0.217	0.209	0.208	0.210	0.212	0.213	0.217	0.210	0.216	0.209

(continued)

Appendix G: Results Excluding U.S. Firms (continued)

Panel B: Effects of CDS on Capital Investment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0023	0.0043**	0.0029	-0.0052**	0.0026	-0.0002	0.0026	-0.0050*	-0.0032	-0.0022	0.0007
		(0.0021)	(0.0021)	(0.0021)	(0.0026)	(0.0018)	(0.0021)	(0.0026)	(0.0027)	(0.0023)	(0.0025)	(0.0019)
Country Variable		-0.0013	-0.0000	-0.0018	-0.0019	0.0007	-0.0035***	-0.0023*	-0.0047***	-0.0036**	-0.0050***	0.0041***
		(0.0011)	(0.0013)	(0.0013)	(0.0013)	(0.0009)	(0.0011)	(0.0013)	(0.0016)	(0.0014)	(0.0014)	(0.0012)
CDS Introduction	0.0034*	0.0030	0.0031	0.0035*	0.0056**	0.0035*	0.0033*	0.0038*	0.0050**	0.0035*	0.0036*	0.0034*
	(0.0020)	(0.0021)	(0.0020)	(0.0020)	(0.0025)	(0.0020)	(0.0020)	(0.0020)	(0.0024)	(0.0020)	(0.0020)	(0.0020)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324
Adj. R-Squared	0.230	0.231	0.234	0.231	0.239	0.233	0.237	0.232	0.250	0.243	0.246	0.239

(continued)

Appendix G: Results Excluding U.S. Firms (continued)

Panel C: Effects of CDS on R&D Share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0038	-0.0146**	0.0038	0.0343***	-0.0111**	0.0024	-0.0065	0.0218***	0.0170**	0.0149**	-0.0029
		(0.0062)	(0.0064)	(0.0072)	(0.0085)	(0.0049)	(0.0054)	(0.0079)	(0.0075)	(0.0066)	(0.0064)	(0.0057)
Country Variable		-0.0108**	-0.0295***	-0.0249***	0.0171***	0.0175***	0.0188***	0.0163***	0.0347***	0.0440***	0.0418***	-0.0389***
		(0.0043)	(0.0042)	(0.0046)	(0.0047)	(0.0032)	(0.0028)	(0.0038)	(0.0040)	(0.0041)	(0.0038)	(0.0044)
CDS Introduction	-0.0115	-0.0118	-0.0105	-0.0110	-0.0268***	-0.0122	-0.0110	-0.0125*	-0.0189**	-0.0127*	-0.0134*	-0.0117
	(0.0076)	(0.0077)	(0.0074)	(0.0075)	(0.0080)	(0.0077)	(0.0075)	(0.0076)	(0.0074)	(0.0070)	(0.0071)	(0.0073)
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324	65,324
Adj. R-Squared	0.533	0.534	0.559	0.542	0.553	0.537	0.542	0.536	0.567	0.585	0.578	0.563

(continued)

Appendix G: Results Excluding U.S. Firms (continued)

Panel D: Effects of CDS on Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Creditor Rights					Property Rights			Private Credit Availability		
	Baseline	Creditor Rights	Restriction on Entry	No Automatic Stay	Management Does Not Stay	Secured Creditors First	Law&Order	Corruption	Political Risk	Domestic Credit to Private Sector	Private Credit	Ownership Concentration
CDS Introduction x Country Variable		0.0125	0.0355**	0.0166	-0.0248	-0.0081	0.0230*	0.0585***	0.0104	-0.0003	0.0092	0.0218*
		(0.0166)	(0.0142)	(0.0154)	(0.0174)	(0.0140)	(0.0127)	(0.0163)	(0.0138)	(0.0134)	(0.0127)	(0.0132)
Country Variable		0.0073	0.0076	0.0075	-0.0032	0.0070	-0.0495***	-0.0830***	-0.0834***	-0.0495***	-0.0587***	0.0117
		(0.0075)	(0.0081)	(0.0083)	(0.0092)	(0.0066)	(0.0064)	(0.0068)	(0.0079)	(0.0082)	(0.0079)	(0.0077)
CDS Introduction	0.0102	0.0075	0.0082	0.0105	0.0208	0.0097	0.0107	0.0193	0.0095	0.0114	0.0129	0.0098
	(0.0146)	(0.0149)	(0.0145)	(0.0146)	(0.0165)	(0.0146)	(0.0144)	(0.0146)	(0.0147)	(0.0144)	(0.0144)	(0.0145)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered Standard Errors	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	65,229	65,229	65,229	65,229	65,229	65,229	65,229	65,229	65,229	65,229	65,229	65,229
Adj. R-Squared	0.439	0.440	0.444	0.440	0.440	0.439	0.451	0.462	0.470	0.452	0.455	0.442