

# *Creditor-control rights and the nonsynchronicity of global CDS markets*

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## **Creditor-Control Rights and the Nonsynchronicity of Global CDS Markets**

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## **Creditor-Control Rights and the Nonsynchronicity of Global CDS Markets**

### **Abstract**

We analyze how creditor rights affect the nonsynchronicity of global corporate credit default swap spreads (CDS-NS). CDS-NS is negatively related to the country-level creditor-control rights, especially to the “Restrictions on reorganization” component, where creditor-shareholder conflicts are high. The effect is concentrated in firms with high investment intensity, asset growth, information opacity, and risk. Pro-creditor bankruptcy reforms led to a decline in CDS-NS, indicating lower firm-specific idiosyncratic information being priced in credit markets. A strategic-disclosure incentive among debtors avoiding creditor intervention seems more dominant than the disciplining effect, suggesting how strengthening creditor rights affects power rebalancing between creditors and shareholders.

*JEL Classification:* G14; G15; G33; G34

*Keywords:* Creditor Rights; Global Corporate CDS; Nonsynchronicity; Creditor-shareholder Conflicts

## **Creditor-Control Rights and the Nonsynchronicity of Global CDS Markets**

### **1. Introduction**

A country's institutional environment, comprising an intricate mix of both formal and informal institutions, may affect firm-specific information production. It is well known that information asymmetry inherently exists between firms and investors because investors cannot witness day-to-day firm operations and, with only partial accounting disclosures, investors cannot fully measure a firm's true riskiness. In this paper, we examine how a country's creditor-control rights affect the way firms produce information in the credit markets, as reflected in the nonsynchronicity of credit prices. Greater nonsynchronicity with the market indicates that prices incorporate more firm-specific information (Morck, Yeung, and Yu, 2000).

Creditor rights measure the legal protections creditors have in influencing decisions that affect the value of their positions. They are the rules and the norms governing the reliable execution of debt contracts between creditors and debtors (North, 1981; Acemoglu and Johnson, 2005). Following Djankov, McLiesh, and Shleifer (2007), the four components of creditor rights are: 1) the ability to impose restrictions when a debtor files for an in-court reorganization, which can grant creditors more power before bankruptcy (restrictions on reorganization); 2) the ability to seize collateral and assets after the court approves a petition for reorganization (no asset freeze, no automatic stay); 3) ranking first among creditors in the distribution of proceeds when liquidating a bankrupt firm (secured creditors paid first); and 4) the ability to remove management during a reorganization (no management stay).

Presumably, these creditor rights affect information asymmetries between firms and credit market participants, as well as the nonsynchronicity of credit prices. How creditor rights affect the nonsynchronicity of credit prices remains largely an empirical question, however. In theory they can have either a positive or negative relation.

On the positive side, creditor rights give creditors more control over the management of debtor firms and facilitate creditor corporate governance even before bankruptcy (Nini, Smith, and Sufi, 2012). Good corporate governance ensures effective managerial monitoring and deters managerial expropriation, enhancing the gains from information-based trading available to outside investors. Shareholders and managers in turn improve information disclosure and reduce information asymmetries between firms and investors (Ferreira and

Laux, 2007; Karamanou and Vafeas, 2005) because they may face strict punishment under strong creditor-rights laws.<sup>1</sup> We call this positive effect the “disciplining effect.” More information helps ensure the order of payment and recovery values that creditors can salvage from debtors in the restructuring process, enabling more accurate ex-ante credit-market pricing. These channels in turn lead to more firm-specific information in credit prices and thus higher nonsynchronicity with the market.

On the negative side, better creditor protections might encourage managers and shareholders to make strategic disclosures to avoid creditor intervention. Creditors and shareholders often have conflicting incentives. For example, shareholders may use borrowed funds to invest in riskier projects and boost firm growth (e.g., Jensen and Meckling, 1976; Klock, Mansi, and Maxwell, 2005; Houston, Lin, Lin, and Ma, 2010). Stronger creditor-control rights might weaken creditors’ incentives to monitor opportunistic behavior among firm shareholders, giving firms greater leeway in disclosing information. A risky or aggressively expanding firm may not truthfully disclose actual cash flow. Debt covenants, reorganization restrictions, and changes in management clearly have negative consequences for a firm’s management, especially if a firm is at greater risk of default. Anticipating tough debt renegotiation and premature liquidation, riskier firms might create greater information asymmetries by delaying or reducing information production. This leads to less information incorporation in credit prices, and thus nonsynchronicity declines with the market.

Taken together, these effects may lead to a positive or negative relationship between creditor-control rights and the nonsynchronicity of credit prices, depending on which effect plays a more important role. In this paper, we provide both within-country and cross-country evidence that, on average, a negative effect dominates, and the effect varies based on the specifics of creditor-control rights and firm features.

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<sup>1</sup> For example, Portugal’s 2004 bankruptcy reform states that “Shareholders, managers, and directors of the firm can face criminal or civil liability and suffer restrictions on their personal or professional activities.” The new law is thus extremely punitive if a court believes a firm’s actions directly led to bankruptcy. Similarly, bankruptcy reform in Finland specifies that a “debtor loses authority after the firm enters bankruptcy. The firm has to cooperate with the estate administrator; not doing so can lead to restrictions on the firm’s management, including injunctions against leaving the country. The debtor shall not be released from liability for those debts in bankruptcy that are not repaid in full in the bankruptcy.”

First, as creditor-control rights differ considerably by country, we use a country-level index and the four subcomponents of creditor-control rights to investigate (in a multivariate panel setting) how they affect the nonsynchronicity of credit prices across countries. Heterogeneity in the underlying creditor-rights index may help disentangle the disciplining effect and the strategic disclosure effect. All four components of the creditor-rights index may have a disciplining effect, as stronger creditor rights place stricter constraints on debtor behavior, including economic penalties and legal injunctions. However, debtors' incentives to disclose information strategically could be different. For example, restrictions on reorganization grant creditors more control of the firm before bankruptcy. It could intensify strategic disclosure as a tactic to avoid early interventions by creditors. In comparison, the "secured creditor paid first" component ensures payment to secured creditors after a firm enters bankruptcy. This does not necessarily affect shareholder incentives to disclose information *ex-ante*.

Moreover, we expect the net effect to vary with firm characteristics. We postulate that the motive to avoid creditor intervention is more severe for riskier firms, firms with stronger investment intensity and asset growth, and firms with higher information opacity. Therefore, we expect more pronounced negative effect for these firms.

Second, we examine how pro-creditor bankruptcy law reforms affect 11 countries, including the Netherlands (2003), Finland (2004), Portugal (2004), Spain (2004), Denmark (2008), Italy (2008), Sweden (2010), Germany (2013), France (2014), Mexico (2015), and Switzerland (2015).<sup>2</sup> Such reforms offer a clean identification strategy because they enhance creditor rights by allowing them early involvement in distressed companies, more influence on insolvency proceedings, increased power to seize collateral, and high priority in receiving payments. As the reforms are not implemented at the same time, we exploit the staggered adoption using a difference-in-differences estimation strategy following Favara, Morellec, Schroth, and Valta (2017) and Gormley and Masta (2016).

Based on an extensive dataset of global corporate credit default swaps (CDSs), we investigate whether and how creditor rights affect CDS nonsynchronicity (i.e., the residual firm-specific information content priced in corporate CDSs after controlling for systematic

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<sup>2</sup> Appendix table A5 provides descriptions of these country-level, pro-creditor, bankruptcy law reforms.

country-, region-, and global- level factors). Prior studies show that CDS spreads offer a cleaner, more efficient, and standardized measure of credit risk compared to corporate bond yield spreads.<sup>3</sup> Investment sentiments, liquidity needs, or trading noise are less likely to trigger price fluctuations in the CDS market.<sup>4</sup> Many often perceive CDS investors as more sophisticated and informed than investors in the corporate bond market or the stock market (Lee, Naranjo, and Sirmans, 2021; Acharya and Johnson, 2007; Qiu and Yu, 2012, Hasan et al., 2023) due to the unique CDS market structure in which trades are brokered by investment banks that are well-informed in capital markets. Sophisticated investors demand continuous disclosure and transparency, which intensifies informed arbitrage (Morck, Yeung, and Yu, 2000, 2013; Piotroski and Roulstone, 2004). Therefore, the nonsynchronicity of CDS prices provides a superb measure of the idiosyncratic information in the credit market.<sup>5</sup> Furthermore, testing our hypothesis using CDS data enables us to account for the findings in Shan, Tang, and Winton (2019), which state that CDSs reduce lenders' monitoring incentives, thereby weakening the covenants in loan contracts post-CDS introduction and greatly impairing lenders' ability to improve corporate governance (Nini, Smith, and Sufi, 2012) via firm-specific information (Lee, Naranjo, and Velioglu, 2018) near bankruptcy. Because all sample firms have CDS contracts, we essentially control for changes in lenders' potential information structure after the CDS got introduced, and we focus on debtors' strategic reaction to the changing environment for creditor rights protection.

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<sup>3</sup> For example, see Blanco, Brennan, and Marsh, 2005; Jorion and Zhang, 2007, 2009; Oehmke and Zawadowski, 2017; and Augustin and Izakian, 2019.

<sup>4</sup> The behavior of corporate CDSs and bonds during the COVID-19 crisis provides the most recent example. During the crisis, corporate bonds traded at large discounts to their corresponding CDSs, and the "basis" between the two markets widened most for safer bonds (Spatt, 2020). Corporate bond investors tried to sell safer, more liquid securities to raise cash for liquidity purposes. These debt market disruptions disappeared as soon as the Fed announced the purchase of corporate bonds (Haddad, Moreira, Muir, 2021).

<sup>5</sup> A potential confounding effect might matter due to the empty creditor issue of CDS contracts. CDS enables lenders to hedge their credit risk exposure, weakening their incentives to monitor borrowers (Bolton and Oehmke, 2011). This may lead to less information disclosure. However, Kim, Shroff, Vyas, and Wittenberg-Moerman (2017) argue that reduced lender monitoring leads shareholders to intensify their monitoring and demand increased disclosure from managers. They find that managers in firms with traded CDS contracts increase their voluntary disclosures, which increases the information content of CDS prices. Our study, however, finds that strengthened creditors' rights are on average associated with lower firm-specific information disclosure, which is likely driven by managers' strategic disclosure. Therefore, if there is any bias, the existence of CDS contracts is likely to bias against our results, not the other way around.

We take several steps to construct a CDS nonsynchronicity (hereafter CDS-NS) measure, and the procedure itself is one of the novel features of our study. We first compute CDS excess returns and then apply a multifactor model to separate the systematic and idiosyncratic risk. Specifically, we run regressions of CDS excess returns on the first four principal components of those returns to find the R-squares. The R-squares represent the systematic or market-wide risk priced in the CDS spreads, ranging between 52% and 78%. CDS-NS is the log ratio of  $(1 - R\text{-square})$  over R-square, and it measures the idiosyncratic risk priced in CDS spreads; therefore, it captures firm-specific credit-relevant information. The average firm in our sample has a CDS-NS value of -0.69. The negative sign indicates that the idiosyncratic component is on average lower than the systematic component.

In the first analysis, we use a cross-country panel regression to investigate how the creditor-rights index and its subcomponents affect CDS-NS with a sample of 928 firms in 25 countries from 2002 to 2016. We find that corporate CDS prices are less informative in countries with stronger creditor rights, after controlling for firm-level characteristics, other country-level institutional features, and global financial conditions. On average, a one-unit increase in the creditor-rights score is associated with an average reduction of 3.34% in the  $(1 - R^2)/R^2$  ratio.<sup>6</sup> The relation holds when we account for year and industry fixed effects.

Interestingly, the analysis of the subcomponents of the creditor-rights index reveals that restrictions on reorganization have a negative impact on CDS-NS, but “secured creditors paid first” has a positive effect. “Restrictions on reorganization” is largely about shifting the balance of power from shareholders to creditors while the firm is a going concern (before reorganizations or bankruptcy). The economic magnitude is significant. A one-unit increase in this specific creditor-rights score is associated with a percentage reduction of 11.7% ( $=\exp(-0.124)-1$ ) or an absolute decrease of 5.9% in  $(1 - R^2)/R^2$  from the mean level. Accordingly, debtors have stronger incentives to reduce creditor intervention. In contrast, “secured creditor paid first” relates to increasing secured creditors’ collection power after bankruptcy. It has a

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<sup>6</sup> The creditor-rights index ranges from zero to four. A one-unit change in the creditor-rights index may be due to an increase in any of the four subcomponents of the index: restrictions on reorganization, no automatic stay, secured creditors paid first, or no management stay. If a pro-creditor legal reform increases all four subcomponents of the index, the aggregate creditor-rights index increases by four points and the impact on the  $(1 - R^2)/R^2$  ratio is  $-3.34\% \times 4$  or about -13.3%, which is comparable in size with the average economic impact of the pro-creditor reforms in the difference-in-differences analysis.

limited influence on firms' strategic-disclosure incentive, leading to a dominating disciplining effect. Therefore, our results shed light on the different corporate governance dynamics involved in creditor-protection laws and have potential policy implications for bankruptcy reform.

Consistent with our expectations, we find that the negative effect is prevalent for speculative-grade firms as well as for aggressive firms with more intensive investment and stronger growth in assets. For such firms, a one-unit increase in creditor rights is associated with a relative decrease in the  $(1 - R^2)/R^2$  ratio of 7.4% to 10.6%. Moreover, adverse effects are even more prominent if firms with more intensive investments have greater information opacity. Such firms can experience a decline in the  $(1 - R^2)/R^2$  ratio by over 25.6% for a one-unit change in creditor rights. Firm opacity could create more scope for firm managers to obfuscate information in the presence of stronger creditor protections.

To strengthen identification strategy and alleviate endogeneity concern, next we conduct the difference-in-difference analysis of the impact of pro-creditor bankruptcy reforms on CDS-NS. We find that for 11 countries that implement pro-creditor bankruptcy reforms in our sample, the reforms on average lead to a material reduction of CDS-NS (in nonlogarithmic form),  $(1 - R^2)/R^2$ , of over 21.6% ( $=\exp(-0.243)-1$ ). Our finding suggests that the strategic-disclosure effect dominates the disciplining effect, leading to less informative CDS excess returns. Additional test ascertains that the net negative impact of the pro-creditor reforms on CDS-NS is unrelated to changes in firms' investment and financial policies induced by the creditor-rights changes. Moreover, our finding survives a battery of robustness tests including controlling for CDS and country sample-selection bias, employing alternative CDS-NS measures based on the statistical correlation between firm CDS returns and global CDS portfolio returns, and using alternative model specifications.

Furthermore, our finding is robust when we use a two-year window difference-in-difference event study with propensity score matching. Within this more stringent methodology, we consider four alternative channels that may explain the reduction of CDS-NS: (i) lower price discovery due to the reduced information capacity among bank dealers following the CDS introduction, (ii) changes in CDS markets over time, (iii) reduced uncertainty in a CDS trigger event, and (iv) higher financial securities synchronicity following

stronger European integration.<sup>7</sup> Our results continue to hold after controlling for these channels.

This study contributes to various research streams. First, to the best of our knowledge, this is the first paper to examine the determinants of comovement and nonsynchronicity of global corporate CDS spreads.<sup>8</sup> At an international level, Schwaab, Koopman, and Lucas (2017) investigate the sources of cross-country default clustering, and Augustin, Jiao, Sarkissian, and Schill (2020) show that listing in multiple countries improves CDS-equity integration because it reduces information frictions. Our study finds that creditor rights, along with other country-level features such as property rights, shareholder rights, market conditions, and firm-level attributes including firm risk, investment intensity, asset growth, and information opacity, are major determinants of global corporate CDS nonsynchronicity.

Second, our study extends the literature on stock-price nonsynchronicity and information disclosure over the past three decades in international credit markets.<sup>9</sup> The dominant view in this literature is that higher stock-price nonsynchronicity is associated with lower firm opacity (greater transparency) and more complete firm-specific information. However, this issue is relatively underexplored in international credit markets due to a lack of representative global bond market data. We overcome the data hurdle by using more standardized, international, market-based CDS prices.

Third, our study contributes to the burgeoning literature on creditor-control rights.<sup>10</sup> It is most closely related to several studies that show adverse effects of creditor-control rights on

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<sup>7</sup> We thank two anonymous reviewers and the editor for suggesting that we consider these alternative channels.

<sup>8</sup> Existing papers that study CDS comovements across countries mainly focus on sovereign CDS spreads rather than corporate CDS spreads (see for example Longstaff, Pan, Pedersen, and Singleton, 2011; Augustin and Tédongap, 2016; Benzoni, Collin-Dufresne, Goldstein, and Helwege, 2015). Several studies investigate the comovement of corporate CDS spreads within a region (Berndt and Obreja, 2010), within a country under normal economic conditions (Jorion and Zhang, 2007, 2009; Ericsson, Jacobs, and Oviedo, 2009), and under economic stress (Anderson, 2017).

<sup>9</sup> For a partial list, please see Roll (1988); Wurgler (2000); Morck, et al. (2000, 2013); Durnev et al. (2004); Piotroski and Roulstone (2004); Ferreira and Laux (2007); Hutton, Marcus, and Tehrani (2009); and Haw et al. (2012). Morck, Yeung, and Yu (2013) provides an excellent survey and discussion of the related literature on the sources of firm-specific stock return nonsynchronicity and its impact on the real economy.

<sup>10</sup> Prior cross-country studies examine the impact of creditor rights on investment policy (Acharya, Amihud, and Litov, 2011), financing policy (Djankov, McLiesh, and Shleifer, 2007), dividend policy (Brockman and Unlu, 2009), access to finance (La Porta et al., 2008), financing costs (Bae and Goyal, 2009), the premium between bond and CDS prices (Feldhüter, Hotchkiss, and Karakas, 2016), internal corporate governance (Ferreira, Ferreira, and Mariano, 2018), the financing of innovation (Mann, 2018), and banks' risk-taking and monitoring incentives (Houston, Lin, Lin, and Ma, 2010). In a single-country setting, debt covenant violations (ex-post) can

debtor welfare (Von Lilienfeld-Toal, Mookherjee, and Visaria, 2012; Vig, 2013) and financial reporting informativeness (Hamdani et al., 2022). However, the first two studies do not examine how creditor rights affect credit-market information production by debtors and the corresponding price informativeness, and Hamdani et al. (2022) only examine a single country case. Our study reveals that a disciplining effect and a strategic-disclosure effect coexist but have different net effects on firm-level information production, conditional on firm characteristics and the specific dimensions of creditor rights.

Our findings illuminate an intricate power rebalancing process between creditors and debtors when creditor-rights laws change. In this respect, our study contributes to a wider subarea of the law and finance literature that investigates the unintended consequences of laws and regulations (i.e., outcomes either unanticipated by regulators or not the objective of the regulation) (Spatt, 2006). In fact, firms are not always passive subjects of laws and regulation; rather, they adjust to the new settings. Sometimes their altered behavior reflects the intent of the law or regulation; other times it is not expected, as in the case of regulatory arbitrage. Finally, our study contributes to the emerging literature on cross-country institutional features and the CDS market. Lee, Naranjo, and Sirmans (2016) show that firms with assets in foreign countries with better property rights (institutional channel) and/or equities listed on foreign stock exchanges with stronger disclosure requirements (informational channel) have lower CDS spreads. Bartram, Conrad, Lee, and Subrahmanyam (2021) find that CDS initiation affects real decisions within firms, and this impact is larger in countries with weaker property rights. Our study differs from their investigations in two respects: i) we examine how country-level institutional features and firm-level attributes explain the idiosyncratic risk priced in corporate CDSs; and ii) we focus on creditor-control rights instead of property rights.

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trigger an increase in creditor-control rights, which enhances creditor bargaining positions in renegotiations. Several studies show how covenant violations in the United States affect firm investment, financing policies, employment risk, board composition, corporate governance, and manager disclosures (e.g., Chava and Roberts, 2008; Roberts and Sufi, 2009; Nini, Smith, and Sufi, 2009, 2012; Falato and Liang, 2016; Ferreira, Ferreira, and Mariano, 2018; Feldhütter, Hotchkiss, and Karakas, 2016; Mann, 2018; Vashishtha, 2014).

## 2. Hypothesis development

We propose two opposing effects of creditor rights on CDS-NS: a disciplining effect on borrowers, and borrowers' increased incentives to disclose information strategically to avoid creditor intervention.

On one hand, creditors have greater power in corporate governance, business intervention and reorganization, and debt renegotiation in countries with strong creditor rights. Corporate creditors traditionally remain passive bystanders until firms are in default, but the empirical literature extensively documents how creditors affect corporate governance. Gilson (1990) finds evidence that, in negotiated restructurings, banks influence the appointment of directors both directly and through share ownership. Kaplan and Minton (1994) find that poor financial performance triggers the appointment of former bank directors to the boards of Japanese firms, which indicates that, as large and powerful creditors, banks actively influence corporate governance. Nini, Smith, and Sufi (2012) show that creditors play an active role in corporate governance before bankruptcy, when firm performance deteriorates and firms breach financial covenants. In these circumstances, creditors exert an informal influence on internal corporate governance with amended credit agreements that have tighter restrictions on corporate policies, and they improve corporate control, as reflected by a decline in acquisitions, capital expenditures, leverage and shareholder payouts, as well as increased CEO turnover. In a similar spirit, Ferreira, Ferreira, and Mariano (2018) show that financial covenant violations favor board appointments of new directors with links to creditors and lead to the adoption of creditor-friendly policies outside bankruptcy.<sup>11</sup> Anderson, Mansi, and Reeb (2004) provide evidence that corporate governance entities such as boards and audit committees are important elements affecting the reliability of financial accounting reports.

In sum, enhanced creditor-control rights strengthen lenders' power in corporate governance and the insolvency process. A firm has an incentive to improve the timeliness and

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<sup>11</sup> Covenant breaches grant more power to creditors because once the firm fails to uphold the loan terms, the creditor becomes eligible to file for bankruptcy. Until then, creditors do not have formal direct control over management. In the multicountry setting of this paper, however, we do not look at covenant violations to detect changes in the strength of creditor rights, because it is hard to find detailed information about covenant violations for firms outside of the United States. We focus instead on pro-creditor reforms and cross-country variation in the creditor-rights index.

quality of its corporate disclosure voluntarily, which we call a “disciplining effect.”<sup>12</sup> If this effect dominates, voluntary disclosure leads to more information disclosures about firm value and greater nonsynchronicity of CDS prices.<sup>13</sup>

On the other hand, strong creditor rights may lead to strategic information disclosure from debtors. The external rebalancing of power between shareholders and creditors in law affects their behavior. Creditors may have less incentive to monitor managers and shareholders, as they are protected by stronger creditor-rights laws. Less monitored firms, in turn, have more discretion over information disclosure, so they release good news in a timely manner and hoard bad news.

Due to conflicts of interest between shareholders and debtholders, managers have incentives to disclose information strategically to circumvent creditor intervention. The model in Jin and Myers (2006) envisions firm managers controlling at least a portion of public access to fundamental information about firms and having incentives to stockpile bad news.<sup>14</sup> Strong creditor rights impose restrictive debt covenants on leverage, investment activities, shareholder payouts, and even changes to the management team. Dechow, Sloan, and Sweeney (1996) show that important motivations for earnings manipulation include the desire to raise external financing at low cost and to avoid debt covenant restrictions. Hamdani et al. (2022) find that after a 2013 court decision that enhanced creditor-control rights in Israel, affected firms changed their accounting practices by increasing long-term discretionary accruals and decreasing accounting conservatism, which led to a decline in the informativeness of their financial reporting. Accordingly, managers may smooth earnings, delay or hide news, or reduce

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<sup>12</sup> According to signalling theory (Spence, 1973), the primary objective of corporate disclosure is to inform analysts and investors about firm quality and value.

<sup>13</sup> Haggard, Martin, and Pereira (2008) and Gul, Kim, and Qiu (2010) find that the stocks of firms with better voluntary disclosure ratings or stricter auditors move more independently (higher nonsynchronicity).

<sup>14</sup> Jin and Myers (2006) provide cross-country evidence that measures of opacity in a given national market are associated with both higher average R-square and higher crash risk for the firms in that country. Using a firm-specific measure of opacity, Hutton et al. (2009) show that opaque firms are more prone to stock-price crashes, suggesting that managers are able to hide negative information from investors until its accumulation reaches a tipping point sufficient to result in a stock-price crash.

the quality and integrity of financial reports, which reduces CDS price nonsynchronicity.<sup>15</sup> We call this a “strategic disclosure effect.”

This leads to our first hypothesis:

*H1: The level of creditor-control rights in a country is inversely (positively) associated with corporate CDS nonsynchronicity for firms in that country if the moral hazard and strategic-disclosure effects dominate (are dominated by) the disciplining effect.*

Moreover, we expect the negative relationship to dominate in firms where the conflict between shareholders and creditors is high. Such firms have greater incentives to manage the flow of proprietary information. For example, a risky firm that has already violated covenants and is more likely to succumb to financial distress might disclose limited information to avoid creditor intervention.

In addition, aggressive firms with intensive investment and asset growth might selectively disclose information. This allows them to undertake investment projects quickly with minimal creditor intervention. Furthermore, information opacity creates more scope for managers to hide information. The signalling theory posits that the most profitable firms signal their competitive strength by communicating more and better information to the market (Healy and Palepu, 2001). Therefore, safer firms tend to disclose information to separate themselves from risky companies. Taken together, these arguments lead to our cross-sectional hypothesis:

*H2: The adverse effect of creditor rights on CDS non-synchronicity, if any, is more pronounced for firms with higher risk, investment intensity, or growth rates, and firms with greater information opacity.*

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<sup>15</sup> In a similar spirit, Martin and Roychowdhury (2015) find that CDS trading initiation leads to reduced monitoring incentives for CDS-insured lenders, which also become more intransigent creditors in the resolution of distress, resulting in a decline in firms’ reporting conservatism (disclosing bad news in a timelier manner than good news). Shan, Tang, and Winton (2019) find that bank lenders have less incentive to monitor borrowers after a firm’s CDSs begin trading, because CDSs provide creditors with a market-based approach to obtaining protection.

### 3. Construction of the CDS nonsynchronicity measure and sample description

We use global corporate CDS spreads pricing data from the IHS Markit database over the period 2001-2016.<sup>16</sup> For each firm, we select CDS contracts with a five-year maturity (the most liquid segment of the CDS market), carrying a full-restructuring clause (CR), or a no-restructuring clause (XR).<sup>17</sup> The selected contracts are all written on senior debt and denominated in USD, for consistency.<sup>18</sup> We convert the CDS premia frequency from daily to monthly using the average value.<sup>19</sup> We disregard monthly CDS premium observations for months when CDS contract records are missing more than 50% of daily pricing observations.

The variable of interest in our study is the CDS nonsynchronicity (*CDS-NS*) measure. We employ a three-stage approach to construct this measure. First, we calculate CDS excess returns at the firm level for all corporate reference entities in our global sample. Second, we run regressions of alternative, multifactor, international asset-pricing models to obtain the R-squared, the measure of comovement of CDS excess returns. Third, we construct a time-varying measure of *CDS-NS*, defined as  $\log (1-R^2)/R^2$  to capture firm-specific residual idiosyncratic risk.

#### 3.1 Constructing CDS excess returns

Our measure of CDS excess return is equal to the expected cash flows the CDS seller obtains from the CDS buyer over the life of the contract (buyer-premium leg) minus the expected compensation payments in the case of default (seller-protection leg) under the physical real-

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<sup>16</sup> CDS spreads are based on quotes rather than transactions. One concern is that quotes may be slow to update or to capture other liquidity differences that might affect our measure of synchronicity. To ameliorate this concern, we measure CDS contract liquidity/trading frictions using the number of dealer quotes and the number of zero-return days, and we use them as explanatory variables in our multivariate regressions. The liquidity measures are always insignificant. For parsimony, they are not in the main analysis.

<sup>17</sup> We use CDS contracts with a CR restructuring clause in our main analysis because they are the most representative with the highest number of observations in our sample. We use CDS contracts with an XR clause in our robustness test. Because the modified-modified restructuring clause (MM) and a modified restructuring clause (MR) samples are mostly regional rather than global, we do not use them in our analysis.

<sup>18</sup> CDS contracts denominated in EUR are widely used around the world; however, we verified that no firm in our CR selected sample for which we have a five-year CDS contract is denominated in EUR and not in USD, whereas 496 firms in our sample have five-year CDS contracts denominated in USD but not in EUR. Thus, selecting only USD-denominated contracts enlarges rather than shrinks our global sample.

<sup>19</sup> We also use the end-of-month value and the monthly median value to measure monthly CDS premium, and the results are very similar. Indeed, the mean, median, and end-of-month values have pairwise correlations above 95%.

world probability of default (PD) measures from the National University of Singapore's Risk Management Institute (NUS-RMI). The RMI PD measures are publicly available default signals for firms around the world and computed from numerous data sources.<sup>20</sup> Table A1 provides the details about the NUS-RMI database and the procedure to obtain CDS excess returns.

According to Campello, Chen, and Zhang (2008), Bongaerts, De Jong, and Driessen (2011), and De Jong and Driessen (2012), CDS excess return constructed this way represents a better measure of returns than ex-post CDS realized returns in an asset-pricing model setting, such as the one we apply in the next step of the analysis to gather our  $R^2$  measure of CDS synchronicity.<sup>21</sup> Moreover, it removes the default-risk component from expected default probabilities. This allows us to focus on compensation for unexpected default risk, which is affected by firm-specific information production in response to a shock, along with compensation for market-wide (systematic) risk and market frictions, etc. In the next step, we apply the multifactor model to firm-level CDS excess returns to separate the systematic risk from the idiosyncratic risk.

### 3.2 Estimate $R^2$ measures

Next, we follow Morck, Yeung, and Yu (2000) to obtain firm-level  $R^2$  measures of commonality in CDS excess returns. We extract principal components (PCs) from the correlation matrix of country-average CDS excess returns using principal components analysis (PCA) consistent with Pukthuanthong and Roll's (2009) global stock-market integration

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<sup>20</sup> Bongaerts et al. (2011) note that using real-world default probabilities is a better methodology than estimating rating-implied probabilities. Specifically, over the financial-crisis period (2007-2009), the real-world measure displays a great deal of variability that reflects changed market conditions. This variability cannot be captured easily by using rating-based historical default probabilities (which are backward-looking measures). De Jong and Driessen (2011) and Berndt, Douglas, Duffie, and Ferguson (2018) use Moody's KMV EDF default probabilities to generate CDS excess returns. Berndt (2015) shows that Moody's EDF and NUS-RMI probability of defaults (PD) are quite close: the median annualized five-year EDF PD and the median NUS-RMI PD are, respectively, 35 and 37 basis points over a sample of 240 firms from January 2001 to June 2010.

<sup>21</sup> As those papers explain, constructing expected excess returns in this way rather than averaging ex-post realized excess returns allows us to estimate the ex-ante risk premia more accurately, especially for samples with insufficiently long horizons. Berndt, Douglas, Duffie, and Ferguson (2018) estimate CDS excess returns as the difference between the observed CDS spread and the hypothetical CDS spread, which is derived after setting the expected value of the buyer-premium leg equal to the expected value of the seller-protection leg. This is also an asset-pricing risk premium for a risk-averse CDS seller. Our approach is similar to theirs.

study.<sup>22</sup> This method mitigates eventual concerns related to the correlation between the covariates of the factor regression models. The extracted principal components (PCs) are orthogonal by construction. We then use the first, second, third, and fourth PCs in a 24-month firm-level rolling regression model (Eq. 1) to explain CDS excess returns.

$$R_{CDS,j,i,t}^e = \alpha_{i,t} + \beta_{j,t} PC1_t + \gamma_{j,t} PC2_t + \delta_{j,t} PC3_t + \vartheta_{j,t} PC4_t + \varepsilon_{j,i,t} \quad (1)$$

where firm  $i$  is domiciled in country  $j$  in month  $t$ .

For a robustness check, we also obtain firm-level  $R^2$  measures using a three-factor model (see appendix A2 for details). The time-series of average  $R^2$ s obtained using CDS excess returns for contracts with a CR restructuring clause is illustrated in figure 1 for both the 4-PC regression and the three-factor models. Given the rolling-regression methodology explained above, the series runs from January 2002 to December 2016.

We observe from figure 1 that the average  $R^2$  from the 4-PC regressions ranges between 52% and 78% and remains consistently above 60% throughout the European sovereign debt crisis. It declines from the last quarter of 2015 to a 50% level at the end of the sample period. The average  $R^2$  from the three-factor regressions behaves in the same fashion, but with slightly more variation, and is around 60% from January 2005 until March 2008, when it increases to above 70% and stays at this relatively high level until the beginning of 2009. It steadily declines to 42% at the end of 2009 and then rises sharply again in the fourth quarter of 2010. After a temporary drop-off (perhaps due to the liquidity interventions that lifted market confidence and allayed fears in credit markets during the European sovereign debt crisis), it climbed steadily again from 52% to 76% by the end of 2014. From 2015 it gradually declined back toward 40% at the end of our sample period.

The alternative multifactor international asset-pricing (4-PC and three-factor) models provide comparable explanatory power, as reflected by their R-squares. It is important to note that the time-variations in our CDS-NS measures estimated from these two alternative multifactor asset-pricing models are very similar, especially regarding the timing of peaks and

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<sup>22</sup> Thirty countries are in the PCA correlation matrix (i.e., countries without missing observations in their monthly average CDS excess returns for CR contracts): Australia, Belgium, Bermuda, Brazil, Canada, Cayman Islands, Denmark, Finland, France, Germany, Hong Kong, India, Italy, Japan, Korea, Luxembourg, Liberia, Malaysia, Mexico, Netherlands, Norway, Philippines, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, UK, and USA.

troughs through the recent spate of financial crises. We use the  $R^2$  estimated from the 4-PC model in our main analysis. We use the  $R^2$  from the three-factor model for a robustness check.

[Figure 1]

### 3.3 Obtaining the measure of CDS nonsynchronicity

In the spirit of Morck, Yeung, and Yu (2000), we construct CDS-NS as the log ratio of  $(1-R^2)/R^2$ . The  $(1-R^2)$  measure captures the idiosyncratic component of CDS excess return that PCs cannot explain (i.e., idiosyncratic risk), and  $R^2$  represents the commonality in CDS excess returns. Thus, their log ratio, as defined, can proxy the nonsynchronicity of CDS market prices using the R-square estimates from equation (1).

### 3.4 Information content of CDS nonsynchronicity

Next, we show that the CDS-NS measure is a proxy of firm-specific information content and therefore increases around real corporate events. Roll (1988) and Morck, Yeung, and Yu (2013) argue that firm-specific events lead to higher idiosyncratic variation and less synchronous returns moving with the market. Specifically, a credit-rating downgrade leads to a release of negative private information about an increase in firm risk to the market and an increase in investor incentives to trade on information. Therefore, we expect that CDS nonsynchronicity increases after a rating downgrade.<sup>23</sup>

To test the informativeness of the CDS-NS measure, we conduct a difference-in-differences (DID) analysis around bond-rating changes to test the change in the CDS-NS measure between the event month and the pre-event month for the event firm and the controlling firm. We use three matching methods: 1) matching on time only, 2) matching on time and country, and 3) matching on time, country, and Fama-French 12 industry. Results are presented in table 1.

[Table 1]

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<sup>23</sup> Cortes, Thakor, and Vega (2017) develop a model predicting that the returns to information and the informativeness of the price system increase after a rating downgrade but should not experience a significant change after an upgrade. They find that downgraded firms exhibit higher stock return nonsynchronicity and higher PIN, but they find no significant effect for upgraded firms. We also test rating upgrades and do not find significant changes in CDS-NS. This suggests that rating downgrades are associated with more information surprises than upgrades because firms tend to deliver good news in a more timely and accurate manner. The asymmetry between downgrades and upgrades is also consistent with the dominant significant findings for rating downgrades in the credit market literature (see Badoer and Demiroglu, 2019 and references therein).

There are 193 event-firm/month observations, and 45,636 control firm/month observations. Control firms that have not experienced any bond rating downgrade or upgrade are similar to the treatment firms before the event, as measured by the insignificant differences in CDS-NS between the two groups. The event firm shows an average increase in their CDS-NS from -0.77 to -0.7. The change in CDS-NS for event firms shows that the idiosyncratic component of firms' CDS excess return increases during the month when firms are downgraded. In contrast, the change in CDS-NS for control firms is negligible. The DID (i.e., the change in CDS-NS for event firms minus the change in CDS-NS for control firms) is 0.08 and is statistically significant ( $t=2.93$ ). The other two matching algorithms yield similar results.

Overall, the DID analysis confirms that an increase in the CDS-NS measure is associated with actual corporate rating downgrade events. Thus, CDS-NS is an informativeness measure that reflects firm-specific information revelation in the credit market.

### 3.5 Sample description

After merging the NUS-RMI and IHS Markit databases with the Global COMPUSTAT dataset, which includes firm-level accounting information, as well as with several sources for country-level institutional features (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998), we obtain a global sample of CDS contracts with a CR restructuring clause; it includes 928 firms from 25 countries from 2002 to 2016. Table 2 presents our sample distribution by region, country, and sector in panels A, B, and C, respectively. Panel A shows that firms in North America, Asia, and Europe account for 50%, 24%, and 24% of our global sample, respectively. Our sample also covers a wide range of industries, as shown in panel C, with consumer goods and industrial firms accounting for the largest shares (18% and 16% respectively) of our sample.

[Table 2]

Within the 25 countries in our sample, 11 countries (Netherlands in 2003; Finland, Portugal, and Spain in 2004; Denmark and Italy in 2008; Sweden in 2010; Germany in 2013; France in 2014; Mexico and Switzerland in 2015) adopt bankruptcy reforms that strengthen creditor-control rights, based on Hasan, John, and Kadiyala (2018) and other web sources (see appendix table A5). This offers us a unique opportunity to identify variations in creditor rights

over time within a country. In addition, we use *Creditor rights*, the composite measure of country-level creditor rights, to identify cross-country variations following Djankov et al. (2007). The value of the index ranges from zero to four, with four denoting the highest creditor rights.

Panel A of table 3 provides summary statistics for variables in our analysis in sections 4 and 5. The average firm in our sample has a *CDS-NS* of -0.69, which converts to the ratio of  $(1-R^2/R^2)$  at 50.2% ( $=\exp(-0.69)$ ), where  $R^2$  and  $1-R^2$  are 66.6% and 33.4%, respectively. The negative sign suggests that  $1-R^2$  is lower than  $R^2$ . The median *CDS-NS* is -0.76, with -1.43 for Q1 and -0.03 for Q3, with a standard deviation of 1.06.

[Table 3]

*Creditor rights* has an average value of 1.64, which is similar to La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). The lower value shows that countries in our sample on average have few creditor-control rights. Panel B of table 3 displays average creditor rights scores by country. UK, Hong Kong, Singapore, and Israel have the highest score of 4, signifying the highest creditor protections. In contrast, the United States, Canada, Brazil, Finland, Portugal, and Switzerland have a score of 1; France, Mexico, and Philippines have the lowest score of zero, signifying the lowest creditor protections.

We also include country-level and firm-level variables from prior studies as determinants of firms' CDS price nonsynchronicity. For country-level institutional features, we account for property and shareholder rights. For firm-level characteristics, we include leverage, total assets, market-to-book, recovery rate, and jump risk.<sup>24</sup> We also use the VIX to proxy for global market risk appetite. Variable definitions and data sources are listed in table A4. The average value of *Property rights* is 83.21, and the average value of *Shareholder rights* is 4.18. The average firm in our sample has total assets of \$80 million, a market-to-book ratio of 1.45, and a leverage ratio of 0.35.

In table 4 we provide pair-wise correlation coefficients between *CDS-NS* and our macrolevel country variables. In general, we find that the correlations are fairly low between

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<sup>24</sup> In the unreported results, we also control for CDS contract liquidity/trading frictions, measured by the number of dealer quotes and the number of zero-return days. Both are insignificant, but the creditor-rights variable remains significant. The results imply that CDS liquidity is not a first-order determinant of *CDS-NS* at the monthly frequency. For model parsimony, we do not include these variables in the main analysis.

creditor rights and other control variables. The size of these correlations suggests that multicollinearity is not a serious concern in our regression analyses.

[Table 4]

#### 4. The multivariate analysis of creditor-control rights on CDS nonsynchronicity across countries

##### 4.1 Baseline regression results

To examine how creditor rights affect CDS price nonsynchronicity across countries, we estimate the variations of the following baseline model specification:

$$CDSNonSynchronicity_{i,t} = \alpha + \beta CreditorRights_{i,t} + \gamma FirmCountryControls_{i,t} + YearFE + IndustryFE + \varepsilon_{i,t} \quad (2)$$

where  $CDSNonSynchronicity_{i,t}$  is the log ratio of  $(1-R^2/R^2)$  using the R-squares from the 4-PCs model specification.  $CreditorRights$  is a composite measure of country-level creditor rights.  $FirmCountryControls_{i,t}$  is a vector of firm-level and country-level variables as discussed in section 3. Table 5 Panel A reports our baseline regression results for the full sample based on the CR clause with the highest number of (71,672 firm-month) observations. In columns (1) to (3) the  $R^2$  are from the 4-PC regression model. The fourth column repeats the baseline regression analysis using a measure of CDS-NS from  $R^2$  obtained using the alternative three-factor asset-pricing model specification. The first and second columns control for year and industry fixed effects.<sup>25</sup> The third and fourth column controls for the interaction of year and industry fixed effects to account for any confounding effects attributable to unobserved, time-varying differences across industries. Standard errors in all the regressions are clustered at the country-industry level.<sup>26</sup>

[Table 5]

Our main variable of interest is country-specific creditor rights. The coefficient of  $Creditor rights$  is negative and significant in all three models, indicating that, in countries with stronger creditor rights, firms' CDS prices are less informative after controlling for firm-level

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<sup>25</sup> We do not add country fixed effects in the regressions due to limited variations in creditor-control rights over time within a country.

<sup>26</sup> We find similar results with alternative standard error clustering approaches at the industry-, firm-, and year-level. They are unreported for brevity, but available upon request.

and other country-level institutional features. In terms of economic impact, the coefficient of *Creditor rights* measures the change in *CDS-NS* for a one-unit increase in the creditor rights score. We can readily derive the percentage change in *CDS-NS* (in nonlogarithmic form), the ratio of  $(1 - R^2)/R^2$ , as  $\exp(\beta) - 1$ , where  $\beta$  is the estimated coefficient of  $CreditorRights_{i,t}$ .<sup>27</sup>

In addition, our results shed light on firm and country factors that influence residual idiosyncratic risk priced in global corporate CDSs, which the literature does not systematically study.

First, we consider the influence of country-level institutional features other than creditor rights, including property rights and shareholder protection; these determinants all appear to be important for *CDS-NS*. One major argument for the importance of property rights in security price nonsynchronicity is the prevalence of informed arbitrage (Morck, Yeung, and Yu, 2000). Trading by many risk arbitrageurs, each with unique proprietary information, is thought to capitalize information into share prices (Grossman, 1976; Shleifer and Vishny, 1997). Risk arbitrage of this sort is less economically attractive in countries with weaker protections of private property rights. If a country has stronger property rights, it tends to promote informed trading within the local market, leading to higher nonsynchronicity of security prices. Consistent with this notion, the estimated coefficients for property rights are positive and significant. Our results lend support to prior evidence on the moderating role of property rights protection for the influence of CDS contracts on corporate policies (Bartram, Conrad, Lee, and Subrahmanyam, 2021) and in reducing the impact of home country-level sovereign risk on firms' CDS spreads (Lee, Naranjo, and Sirmans, 2016).

Shareholder rights likely affect corporate governance and information production by firms. We find a positive sign for shareholder rights, which is in line with the stylized fact that more firm-specific information is incorporated into security prices in countries with better

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<sup>27</sup> Suppose the sample mean of *CDS-NS* is  $m$ . For this value we have a corresponding ratio of  $(\frac{1-R^2}{R^2})_{t-1} = \exp(m)$ . Suppose also that the estimated coefficient of  $CreditorRights_{i,t}$  in Eq. (2) is equal to  $\beta$ . If the creditor rights score increases by 1, then (*ceteris paribus*):  $(\frac{1-R^2}{R^2})_t = \exp(m + \beta \times 1) = \exp(m + \beta)$ . The percentage change in the ratio  $(\frac{1-R^2}{R^2})$  is:  $\left[ (\frac{1-R^2}{R^2})_t / (\frac{1-R^2}{R^2})_{t-1} \right] - 1 = \frac{\exp(m+\beta)}{\exp(m)} - 1 = \exp(\beta) - 1$ . One advantage of this expression is that it is not affected by a specific sample mean value.

protected shareholders. More firm-specific information disclosure by firms will increase the firm-specific nonsynchronicity measure  $(1 - R^2)/R^2$ .

Next, we control for the VIX (options implied volatility of the S&P 500 stock market index). Financial market conditions play a significant role in CDS pricing (Longstaff, Pan, Pedersen, and Singleton, 2011). A higher VIX indicates greater uncertainty and deteriorating economic prospects. The coefficient is negative and significant, showing that systematic risk rather than firm-specific risk likely affects *CDS-NS* when the market has greater uncertainty. In other words, CDS prices are more informative regarding firm-specific risk in calm periods than in turbulent times.

At the firm level, the market-to-book ratio is negatively and significantly associated with *CDS-NS*, indicating that growth firms are more likely to move with the market. Firm leverage has a positive and significant coefficient, suggesting that more leveraged firms have a greater idiosyncratic risk component than other firms. We also control for total firm assets, the recovery rate of the CDS contracts, and jump risk; we find that these variables are not significant drivers of *CDS-NS*.

Overall, we find that creditor rights, property rights, shareholder rights, and financial market conditions proxied by the VIX, as well as firm-specific leverage and market-to-book ratios affect the nonsynchronicity of global CDS excess returns.<sup>28</sup>

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<sup>28</sup> Sovereign ratings are not in the regressions because they are highly correlated with other country-level variables. We also exclude a financial crisis dummy because it leads to collinearity with year fixed effects. In unreported tests, we find that the results of the multivariate panel regression survive the following robustness checks. First, we repeat our analysis using a two-stage Heckman model to alleviate potential sample-selection bias concerns for firms with CDS contracts traded. The coefficients for *Creditor rights* remain consistently negative and significant (e.g., -0.037 with  $t=-2.479$ ), suggesting that our results are not specific to firms that have CDS traded. Second, we control for CDS contract liquidity/trading frictions using the number of dealer quotes and the number of zero-return days. The CDS liquidity measures appear always insignificant. Third, we control for the country's legal enforcement, legal origin, and institutional quality (La Porta et al., 1999) to verify whether they may drive the effects we attribute to creditor rights. Prior studies show that a country's strength of legal enforcement is an important factor in the effectiveness of the law. We find that these measures are not significantly associated with *CDS-NS*, but the impact of creditor-control rights persists. All these results are available upon request.

#### 4.2 The impact of the creditor-rights index subcomponents

Different kinds of creditor-rights provisions may lead to different levels of disciplining and strategic disclosure effects. Therefore, we analyze the specific impact of the four subcomponents of the creditor rights index on CDS-NS separately. The results are reported in table 5 Panel B.

As shown in model 1, we find that restrictions on reorganization are inversely related to CDS-NS, and the economic magnitude is significant. A one-unit increase in this component, holding other things constant, is associated with a percentage reduction of 11.7% ( $=\exp(-0.124)-1$ ) or an absolute decrease of 5.9% in  $(1- R^2)/R^2$  from the mean level. This creditor-rights component expands the power of creditors in corporate governance and involves creditors in the reorganization procedure at an earlier stage. When out-of-court restructuring requires majority approval of secured creditors, they have the power to decide whether the company liquidates or restructures. This restricts debtors' ability to choose other solutions, such as strategically filing bankruptcy. To avoid creditor intervention, managers have stronger incentives to disclose information strategically when the company is still a going concern.

In contrast, in model 3 we find that *Secured creditors paid first* is positively related to CDS-NS. In terms of economic magnitude, a one-unit increase in this component score, holding other things constant, is associated with an increase of 12.1% in  $(1- R^2)/R^2$ . This component solely increases secured creditors' collective power after a firm files for bankruptcy. It is less likely to induce firms' strategic disclosure behavior, so the disciplining effect of stronger creditor rights plays a dominant role.

The effects of the other two components ("no automatic stay" and "management does not stay") are less clear-cut. The former presents a strongly significant negative coefficient when used alone in the regression (model 2) but becomes insignificant when controlling for all other subcomponents (model 5); the latter is never significant.

Our results indicate that the laws protecting creditor rights and the various provisions they dictate may lead to readjustments in the balance of power between managers/shareholders and creditors. This can affect the information disclosure incentives of debtor firms. In this respect, our study informs the design of creditor-control rights laws and, more generally, of bankruptcy reforms. Our findings suggest that reforms that further limit activities in

reorganizations should be a last resort to protect creditors in financial environments that are ex-ante informationally opaque.

#### 4.3 Subsample analysis

##### 4.3.1 Relation between creditor rights and CDS price nonsynchronicity conditional upon firm risk and investment

As discussed, the impact of creditor rights on *CDS-NS* is likely complex. The disciplining effect and the strategic disclosure effect are possible channels through which creditor rights affect information asymmetries between firms and investors, leading to different effects on *CDS-NS*. Although we find that the negative effect dominates for the full sample, it is not overly large in magnitude for an average firm. This could be a net effect, where the positive effect partially offsets the negative effect. We expect that the negative effect is strongest in firms that have more severe conflicts between creditors and shareholders and are more prone to manage information production.

Therefore, in panel A of table 6, we conduct subsample analyses based on firm risk (measured by *Investment grade*), capital expenditure intensity, the growth rate of total assets, and the growth rate of property, plant, and equipment (PPE). Year and industry fixed effects are in all model specifications, and standard errors are clustered by country-industry.

[Table 6]

As shown in model 1, the effect of *Creditor rights* is negative and significant for speculative-grade firms only. For example, the coefficient for *Creditor rights* is -0.084 ( $t=-3.161$ ) for firms with greater credit risk. A one-unit increase in *Creditor rights* is associated with a decrease of 8.1% ( $\exp(-0.084)-1$ ) in  $(1-R^2)/R^2$ .

In contrast, the effect of *Creditor rights* is insignificant for investment-grade firms. The difference between the two coefficients is significant at the 1% level. Risky firms usually carry greater uncertainty regarding future cash-flow risk. Hence, creditors have a stronger incentive to intervene in corporate decisions that may affect the value of their position and their future payoff. A stronger negative effect indicates that risky firms have stronger motives to hide information due to more severe creditor and shareholder conflicts of interest, as they are closer to default.

The sample in model 2 is split into quintiles according to capital expenditure intensity. We find that the *Creditor rights* coefficients are negative and significant for firms in the Q1-Q4 and the Q5 columns. However, the magnitude of the coefficient of the Q5 column is higher (-0.095) than the coefficient in the Q1-Q4 column (-0.038), and the difference is statistically significant. The coefficient of the Q5 column translates into a relative decline of 9.10% ( $=\exp(-0.095)-1$ ) in  $(1-R^2)/R^2$  for firms with higher investment intensity. This is in line with our expectation that firms with greater investment intensity face stronger creditor and shareholder conflicts.

In model 3, the inverse effect of creditor rights on *CDS-NS* is significantly larger for firms with higher growth rates in total assets ( $Assets_t/Assets_{t-1}$ ). The coefficient of *Creditor rights* for firms with a higher (Q5) growth rate is -0.084 ( $t=-3.374$ ) versus -0.016 ( $t=-1.015$ ) for firms with a lower growth rate, respectively. A similar pattern occurs in model 4, where we use the PPE growth rate. The coefficient of -0.128 estimated for firms in the highest quartile of PPE growth (Q5) indicates that a one-unit increase in creditor rights is associated with a reduction of 12% in the  $(1-R^2)/R^2$  ratio.

Taken together, our results demonstrate that the negative relationship between *CDS-NS* and creditor rights is prevalent for riskier and more aggressive firms that are subject to greater creditor and shareholder conflicts. This is consistent with our expectation that firms sensitive to creditor intervention tend to disclose little firm-specific information in a strong creditor-rights environment. Overall, we find that the impact of creditor rights on *CDS-NS* is not uniform; rather it differs depending on firm risk, investment intensity, and asset growth.

#### 4.3.2 Relation between creditor rights and CDS price nonsynchronicity conditional upon information asymmetry

We next examine whether the information environment and firm opacity create more scope for firm managers to obfuscate information in the presence of stronger creditor protections. We focus on firms in the Q5 quintile of *Capex intensity* that experience intense investment activity (more information-sensitive firms). Within this sample we analyze the relationship between creditor rights and *CDS-NS* in firms with ex-ante greater or lower information asymmetry, as

proxied by their bid-ask spreads and Amihud measure in the past period. These subsample results are in panel B of table 6.

Consistent with our intuition, we observe a predominantly negative and significant coefficient for creditor rights in firms with high capital expenditures and high information asymmetry. The estimated coefficient is -0.484 ( $t=-6.341$ ) in the bid-ask spread model, and for the Amihud model it is -0.298 ( $t=-2.861$ ). The negative impact is both statistically significant and economically sizeable. For example, the coefficient of -0.298 translates to a reduction of 25.6% ( $=\exp(-0.298)-1$ ) in the  $(1-R^2)/R^2$  ratio for a one-unit increase in *Creditor rights*. For firms with greater investment intensity, the inverse impact of *Creditor rights* on *CDS-NS* is higher when such firms already suffer from higher asymmetric information.

## 5. The DID analysis of pro-creditor rights legal reforms on CDS nonsynchronicity

### 5.1 Empirical design

Next, we use country-level bankruptcy reforms to identify exogenous sources of variations in creditor rights within a country. Table A5 in the appendix provides a detailed description of 11 bankruptcy law changes that are pro-creditor rights, including Netherlands (2003), Finland (2004), Portugal (2004), Spain (2004), Denmark (2008), Italy (2008), Sweden (2010), Germany (2012), France (2014), Mexico (2015), and Switzerland (2015), and their impact on creditors.<sup>29</sup> The pro-creditor-control rights features of these reforms include allowing creditors to be involved in the procedure at an earlier stage, to seize collateral when it is a pledge/mortgage, higher priority ranking for secured creditors, no automatic stays, creditor ability to opt out of restructuring inside bankruptcy, and not allowing management to stay in control of the firm. Our hypothesis H1 (see section 2.4) posits that the binding, pro-creditor-control-rights legal reforms these countries adopt have a disciplining effect (with positive impact on *CDS-NS*); they also create more intense conflicts between creditors and

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<sup>29</sup> Hasan et al. (2018) construct a creditor-rights index (CRED) and a restructuring index (REORG) on the basis of provisions of the revised bankruptcy code in each country. For identification purposes, we focus on the pro-creditor bankruptcy reforms only. They have changes in at least one of the four components of creditor-control rights. We exclude bankruptcy reforms that are pro-debtor or pro-restructuring in nature. Because these reforms do not always benefit debtors at the expense of creditors, their impact on *CDS-NS* is not necessarily opposite to that of the pro-creditor reforms. For example, reforms giving priority to a recovery plan presented by debtors' shareholders aim to maximize debtors' total value to creditors, employees, owners, and the whole economy.

shareholders/managers, thereby forming stronger incentives for firms to manage information disclosure strategically (with negative impact on CDS-NS). It is ultimately an empirical issue to reveal which effect dominates.

Using a difference-in-differences estimation strategy similar to Favara, Morellec, Schroth, and Valta (2017) and Gormley and Masta (2016), we compare changes in CDS-NS for firms in countries that implement bankruptcy law reforms that strengthen creditor rights to changes in CDS-NS for firms in other countries that do not implement such reforms. The control group includes firms in countries that do not introduce pro-creditor laws, as well as firms in countries that eventually pass such laws before those reforms became effective. Specifically, we estimate the variations of the following model:

$$\begin{aligned} CDSNonSynchronicity_{i,t} = & \alpha' + \beta' ProCreditorRightsEvent_{i,t} + \\ & \gamma FirmCountryControls_{i,t} + YearFE + IndustryFE + CountryFE + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where  $CDSNonSynchronicity_{i,t}$  is the log ratio of  $(1-R^2/R^2)$  using the R-squares from the 4-PCs model specification.  $ProCreditorRightsEvent$  equals 1 if a firm is in a country that passes a bankruptcy law that strengthens creditor-control rights in a certain month or later, and zero otherwise.  $FirmCountryControls_{i,t}$  is a vector of firm-level and country-level variables as discussed in section 3.

We also control for year, industry, year-by-industry, and country fixed effects in the regressions. The inclusion of these fixed effects ensures that our difference-in-differences estimates are robust to unobserved, time-varying differences across industries and countries that could otherwise confound our analysis. Industry fixed effects are based on two-digit SIC codes. We adjust the standard errors by clustering them at the country-industry level.<sup>30</sup>

## 5.2 Results

Table 7 reports the test results for how strengthening creditor rights due to a bankruptcy law change affects CDS-NS. We find that, on average, the coefficient for the pro-creditor event is negative and significant in all specifications, and the impact is both statistically and economically sizeable. The coefficient of pro-creditor reform measures the change in  $CDS-NS$

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<sup>30</sup> We find similar results with alternatively clustering standard errors at the industry-, firm-, and year-level, as shown in appendix table A8 at columns (3) to (5).

after the reform for the treatment group compared to the control group. The percentage change of *CDS-NS* (in nonlogarithmic form), the  $(1 - R^2)/R^2$  ratio, could be derived as  $\exp(\beta') - 1$ , where  $\beta'$  is the estimated coefficient of the dummy variable,  $ProCreditorRightsEvent_{i,t}$ . For example, the coefficient of the dummy variable,  $ProCreditorRightsEvent_{i,t}$  in column 3 is -0.243 ( $t=-4.322$ ). So, a pro-creditor rights event could reduce the  $(1 - R^2)/R^2$  ratio by 21.6% ( $=\exp(-0.243)-1$ ).

Our finding shows that creditor rights are, in general, associated with less firm-specific information production, indicating that the strategic information-disclosure effect dominates the disciplining effect. The pro-creditor bankruptcy reform events enable us to isolate the impact of changes in creditor rights and identify unequivocally a causal link between country-level creditor-control rights and firms' information production in the credit market. The coefficients for firm and country control variables, when significant, have signs consistent with the results in the previous section.<sup>31</sup>

[Table 7]

Given the importance of controlling for country-related factors, in columns (4) of table 7 we include country fixed effects (after removing property rights and shareholder protection which cannot be included in the panel regression with country fixed effects given their time-invariant nature). The result for the pro-creditor event dummy remain unchanged. Next, in column (5) we control for additional time-varying variables. The level of GDP per capita captures the country economic welfare and development. We also control for the stock price nonsynchronicity (Stock-NS) and the Amihud measure. In a seminal study, Morck, Yeung, and Yu (JFE, 2000) show that stock prices move together more in poor economies than in rich economies mostly due to difference in country institutional settings, such as property rights, rather than in country fundamentals. Among developed economies, higher nonsynchronicity of

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<sup>31</sup> In unreported results, we also consider credit to the private sector from financial institutions as a proxy for the extent of credit market development. Levine, Loayza, and Beck (2000) document that creditor rights are related to the development of financial intermediaries, and it is likely that credit markets become more informative with increased involvement of financial intermediaries. Indeed, we find that banking sector development is positively related to CDS nonsynchronicity, but our main results still hold. However, because banking sector development has a very high correlation with shareholder rights, including credit to the private sector and shareholder rights in the same regression is likely to induce a multicollinearity issue; accordingly, we exclude the former. These results are available upon request.

stock returns is associated with stronger public investor property rights that (alongside market liquidity, here proxied by the Amihud measure) promote informed arbitrage on firm-specific information. Our results continue to hold after controlling for these variables.

## 6. Robustness checks and discussions

In this section, we conduct a number of robustness checks to test whether our main results hold. First, we consider the impact of creditor rights changes on firm's investment and financing (as alternative explanation to the decrease in CDS-NS). Second, we control for alternative proxies for CDS-NS, models with different clustering of standard errors, and CDS sample-selection bias. Third, we use a more stringent empirical design to test our hypothesis: a diff-in-diff event study with propensity score matching. Finally, we test four alternative channels that may explain the reduction of CDS-NS after the pro-creditor law reforms are adopted.<sup>32</sup>

### 6.1 Impact of pro-creditor reforms on CDS-NS via firm investments and financing policies

CDS-NS may change after pro-creditor reforms via their impact on firm investment and/or financing policies rather than because of a change in firm credit-risk information disclosure. For instance, if creditor-friendly laws reduce a firm's risk-taking, the demand for its CDS contracts might also decrease, potentially affecting CDS nonsynchronicity. To rule these alternative explanations out, we use a two-step analysis. First, we test whether the pro-creditors law reforms have a significant impact on firm investment intensity and leverage, using the same diff-in-diff setting of table 7 with capital expenditures, asset growth, and leverage as the dependent variables. The results are in columns (1) to (3) of table 8.

Regarding leverage, previous studies document mixed results for the impact of creditor rights on firm leverage (e.g., Rodano et al., 2016, Acharya et al., 2011; Vig, 2013, and Closett and Urban, 2019). Theoretically, creditor rights can have complicated effects on leverage. On the supply side, strengthening creditor rights may reduce ex-ante agency costs for lenders (Hart, 1995). This may deter borrowers from default via the credible threat of liquidation and enable lenders to seize and liquidate collateral easily to partially recover their dues upon default. Thus,

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<sup>32</sup> We thank two anonymous referees and the editor for their valuable suggestions on the robustness tests in this section.

strengthening creditor rights could increase credit and leverage (e.g., La Porta et al, 1998; Djankov et al., 2007). On the demand side, two effects of stronger creditor rights are at play (i.e., the income effect and the substitution effect) (Vig, 2013), which could lead to either increases or decreases in credit demand.<sup>33</sup> Column (1) of table 8 shows that creditor rights reforms have an insignificant impact on leverage after controlling for country-level and firm-level variables. We believe the diff-in-diff setting provides a clean test of the relationship and that the opposing effects of creditor rights on leverage may offset each other and nullify the overall impact. In columns (2) to (3), we discover no significant impact on capital expenditure intensity and asset growth.

In the second step, we test the impact of firm investments and financing policies on *CDS-NS*. We add the variables related to firm risk-taking over time (*Capex intensity* and *Asset growth*) as additional control variables in the diff-in-diff analysis. In column 4 of table 8, we observe that *Capex intensity* and *Asset growth* are both insignificant to explain *CDS-NS*. Leverage is already controlled for in table 7. Although leverage has a significant impact on *CDS-NS*, in column 1 of table 8 we find that pro-creditor rights reforms have an insignificant impact on leverage. Taken together, these results rule out empirically the alternative explanation of pro-creditor law reforms affecting *CDS-NS* via changes in firm investment and financing policies.

[Table 8]

## 6.2 Alternative *CDS-NS* proxies, controls for *CDS* sample-selection bias, different clustering of standard errors

We examine the robustness of our study using alternative *CDS* nonsynchronicity measures. First, we repeat our baseline DID analysis of how creditor rights affect *CDS-NS* basing the nonsynchronicity measure on the R-squares from the three-factor model. The coefficient of the

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<sup>33</sup> The income effect suggests that higher credit supply reduces interest rates and collateral requirements, increasing borrower debt capacity and leading to higher credit demand. The substitution effect suggests that due to an increased threat of liquidation from lenders and higher deadweight costs of bankruptcy (Hart and Moore, 1994), borrowers move toward instruments that pose lower liquidation risk, resulting in lower credit demand and lower leverage (Rajan and Zingales, 1995; Acharya et al., 2011).

*ProCreditorRightsEvent* is consistently negative and highly significant, which shows that our results are robust to the *CDS-NS* measure derived from the multifactor model. We also use end-of-month and median CDS prices in lieu of average prices to calculate monthly CDS excess returns. The results (unreported to save space) are all qualitatively similar.

Second, we create alternative *CDS-NS* measures as rolling nonparametric correlations  $\rho = (p$  Pearson,  $s$  Spearman, and  $k$  Kendall) that measure statistically how much the CDS excess returns of firm  $i$  correlate with the average excess returns of a global CDS market portfolio over a rolling window of 24 months. Notably, these correlations do not require the use of any asset-pricing model. We create the global portfolio returns in two ways: 1) taking the equally weighted average of CDS excess returns across all firms (except those in the same country of firm  $i$ ), and 2) taking the equally weighted average of all CDS excess returns for all firms in our sample. On average, the squared correlations  $\rho^2$  have a 40%-45% co-movement with the R-squared from the 24-month rolling three-factor regression model. Given a (Pearson, Spearman, or Kendall) correlation  $\rho = (p, s, k)$ , we use  $1 - |\rho|$  and  $1 - \rho^2$  to create the alternative *CDS-NS* measures (in logistic transformations). We then repeat the diff-in-diff analysis of table 7 using these measures. In table A7 in Appendix, we consistently find a negative and highly statistically significant coefficient for the *Pro-creditor rights event* dummy.

Third, we test alternative country samples to alleviate potential sample biases. We filter the sample by the number of CDS reference entities in each country: first, we use only countries with at least five CDS reference entities, and then we expand the sample to include countries with at least 10 CDS reference entities. Finally, we conduct our analysis with standard errors clustered at the industry-, firm-, and year-level, respectively. Across these checks reported in appendix table A8, our main results remain qualitatively unchanged.

### 6.3 Event-study and propensity-score matching

To better isolate the *CDS-NS* impact for those countries that experience a change in creditor rights, we employ a more stringent empirical method. Specifically, we use an event-study method to compare *CDS-NS* changes for firms in countries with a change in creditor

rights with counterparts in other countries via a propensity-score matching algorithm during a short event window.<sup>34</sup>

Following the event-window cohort approach of Gormley and Matsa (2011), for each event (“cohort”) we first divide firms into two groups: firms in countries with a creditor-rights law change in that cohort (treatment group), and firms in countries with no creditor-rights law change in that cohort (control group). Second, we identify a more strictly matched control group of firms with similar characteristics as the firms in the treatment group using propensity-score matching (PSM). Specifically, we perform the match using all the firm-level variables for the month before the reform in table 7. The PSM ensures that the results are not due to differences in treated firms, but rather due to the treatment itself. Finally, we look at the respective changes in CDS-NS in the two groups from two years before to two years after the event.

The results are in columns 1 – 4 of table 9 panel A. We find that the diff-in-diff estimator (i.e., the *Pro-creditor rights event dummy*) consistently presents a significant negative sign in all regression specifications. Moreover, the magnitude of the coefficients is substantially larger than those in table 7. The event study design enables us to capture the cleaner and stronger impact by focusing only on countries with creditor-rights reforms and for a concentrated period around the reforms.

[Table 9]

#### 6.4 Alternative channels

In this final section, we test four alternative channels that might explain our results, using the difference-in-difference analysis with event study and propensity score matching.<sup>35</sup>

First, Shan, Tang, and Winton (2019) find that CDS reduces lenders’ monitoring incentives, meaning lenders put fewer covenants in loan contracts post-CDS introduction. Without covenants, lenders’ ability to get specific information about whether firms are nearing bankruptcy is greatly impaired (Lee, Naranjo, and Velioglu, 2018). Banks, particularly large investment banks, are major dealers in the CDS markets. With the reduced information capacity

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<sup>34</sup> We thank an anonymous referee for suggesting this method.

<sup>35</sup> We thank two anonymous referees for their suggestions to test alternative channels.

of these banks, firm-specific information is less likely to drive price discovery in the CDS market, which might provide an alternative explanation at the lender's end for lower *CDS-NS*.

To test this alternative channel, we rerun the event study in section 6.3 on the post-global financial crisis (GFC) subsample. The post-GFC period is characterized by a sharp decline in interdealer positions and a rise in central clearing counterparties, partially explained by new regulations (for instance, Dodd-Frank in the United States and EMIR in Europe), large increases in market transparency, and a contraction in dealer trading activity.<sup>36</sup> Thus, in this period the major CDS dealers have less influence on CDS information and price discovery. As shown in column (1) of table 9 panel B, our main results continue to hold for this subsample period. In other words, without a high concentration of less informed bank/CDS dealers, we still observe a decrease in *CDS-NS* (lower credit-risk information), which is more likely related to lower information production at the source (from the debtors).

Second, changes in size and trading activity in the CDS market might drive the observed reduction in *CDS-NS*. After the 2008 global financial crisis, several banks left their roles as dealers, causing single-name CDS trading volumes to decline over time. Piotroski and Roulstone (2004) report higher return nonsynchronicity in stocks with more institutional trading. A similar effect might exist in the CDS markets: lower trading can reduce CDS return nonsynchronicity. To address this concern, we rerun the analysis by adding a control for the size of the CDS market by the country/location of the reference entity. To measure a country's CDS market size, we use the total CDS gross outstanding notional amount for all reference entities domiciled in that country. The data are from the Depository Trust & Clearing Corporation's (DTCC) Trade Information Warehouse (TIW), accessed via Markit, and are available starting from October 2011.

The results are reported in column 2 of table 9 panel B. We still find a negative and significant coefficient for *Pro-creditor rights event* even after controlling for CDS market size.<sup>37</sup> Notably, the CDS gross notional outstanding amount is positive and statistically significant. Although our findings are not subsumed by the gradual reduction in the size of the

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<sup>36</sup> For further discussion and findings, see Aldasoro and Ehlers (2018) and Marra et al. (2019).

<sup>37</sup> These results remain invariant if we measure CDS market size with CDS net notional outstanding and with CDS gross notional transacted for each reference entity instead of gross notional outstanding.

CDS market over time, we do observe that a lower CDS market size reduces *CDS-NS*, consistent with the findings of Piotroski and Roulstone (2004) for the stock market. With less trading, less information on firm-specific credit-risk is discovered and incorporated into prices.

Third, Bartram, Conrad, Lee, and Subrahmanyam (2021) document that CDS suffers less from trigger-event uncertainty when creditor control increases before debtors file for bankruptcy. When creditors can influence whether shareholders enter into reorganization, legal uncertainty decreases. If CDS return nonsynchronicity is a signal of “price noise,” lower CDS trigger-event uncertainty could improve global CDS contracts hedging efficiency and contractual practices, thereby reducing *CDS-NS*. To discern whether this alternative explanation dominates our hypothesis, we consider CDS contracts with XR (no restructuring) clauses. Under this contract term, all reorganization/restructuring events are excluded as a CDS-payment triggering event. Therefore, they do not suffer from trigger-event uncertainty coming from debtor reorganization outcomes.

We conduct the analysis for the CDS contracts carrying a no-restructuring clause (XR). The result is reported in column (3) of panel B of table 9. We continue to find a significant decrease in *CDS-NS* after pro-creditor rights reforms. The results show that the creditor rights events have a negative impact on *CDS-NS* where a potential trigger-event uncertainty channel is less likely at play.

Fourth, as creditor-friendly laws in our sample mainly come from European countries after the introduction of the euro, another reasonable source of concern is that the integration in European financial markets (Hoffmann et al., 2020) may increase return synchronicity of financial securities (and reduce nonsynchronicity and so *CDS-NS*). In order to alleviate this concern, we repeat the event study with PSM using as control group only the European firms in countries that did not experience a pro-creditor event. The results of this analysis are reported in table 9 panel C. We still find that the pro-creditor event dummy has a negative and statistically significant coefficient for both samples of contracts with CR and XR clauses.

We also use the treated and control samples of this latter analysis to visualise the differences in average *CDS-NS* over the event window between firms in countries that have adopted pro-creditor control rights reforms (‘treated sample’) and those in European countries that did not (‘control sample’). Figure 2 presents the cumulative change in average *CDS-NS*

around the pro-creditor rights event, which is indicated as Year 0. The cumulative changes are calculated with respect to Year (-3) used as base year. We observe a negative cumulative change in average CDS-NS after the event Year [0] only for the sample of treated firms. There is no cumulative decrease in average CDS-NS for the other firms in the control group.<sup>38</sup>

[Figure 2]

## 7. Conclusions

Creditor rights protect creditors and have a multidimensional impact on the information asymmetry between firms and investors, leading to different effects on CDS price nonsynchronicity under varying conditions. Creditor rights can affect CDS nonsynchronicity (*CDS-NS*) positively via a disciplining effect or negatively via a strategic disclosure effect. The net effect depends on firm features and creditor-rights components.

Using CDS spreads for 928 companies in 25 countries, we provide consistent cross-country evidence that firms in countries with strong creditor rights have, on average, low CDS-NS. This indicates that the strategic-disclosure effect dominates the disciplining effect of creditor rights, leading to less firm-specific information being priced in credit markets. The analysis of the four subcomponents of the creditor-rights index reveals that restrictions on reorganization have the strongest negative effect, supporting our hypothesis that the strategic disclosure effect dominates when creditor-shareholder conflict is higher. Moreover, a subsample analysis shows that the negative association between creditor rights and CDS-NS is more pronounced and economically significant for firms with greater risk, stronger investment intensity, and higher asset growth. For such firms, the conflicts between managers/shareholders and creditors are more intense and, therefore, managers have stronger motives to strategically disclose information. A higher level of information opacity aggravates this effect.

For better identification, we examine how laws that strengthen creditor-control rights affect CDS nonsynchronicity using a difference-in-differences estimation strategy. Results

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<sup>38</sup> We also conduct t-tests of parallel trends, looking at the average change in CDS-NS during the pre-event years. The test shows that before the pro-creditor rights event there is no statistically significant difference between the average CDS-NS changes year-by-year of the treated and control samples. Test results are available upon request.

show that CDS-NS substantially declines in 11 countries that pass pro-creditor bankruptcy reform laws.

Our results are robust to alternative empirical specifications, CDS sample-selection bias, alternative measures of CDS nonsynchronicity, event-study based DID analysis with propensity-score matching, as well as several alternative explanations.

Overall, our study contributes to the burgeoning research streams on creditor-control rights, security price nonsynchronicity, and global corporate CDS pricing. Our results demonstrate that corporate environments with strong formal and informal institutions, such as those marked by strong creditor rights, may have unintended consequences for firm-specific information production and the information content of global credit markets. Our findings have clear policy implications, as protecting creditors with reforms to limit reorganization activity should not be the first resort in financial environments that are more informationally opaque.

Future studies in this area should focus on how the adverse consequences of strengthening creditor-control rights for credit markets may be ameliorated by a redesign of bankruptcy reforms that can better balance the power of creditors and shareholders (to enhance corporate governance, information disclosure, and the market efficiency of credit prices).

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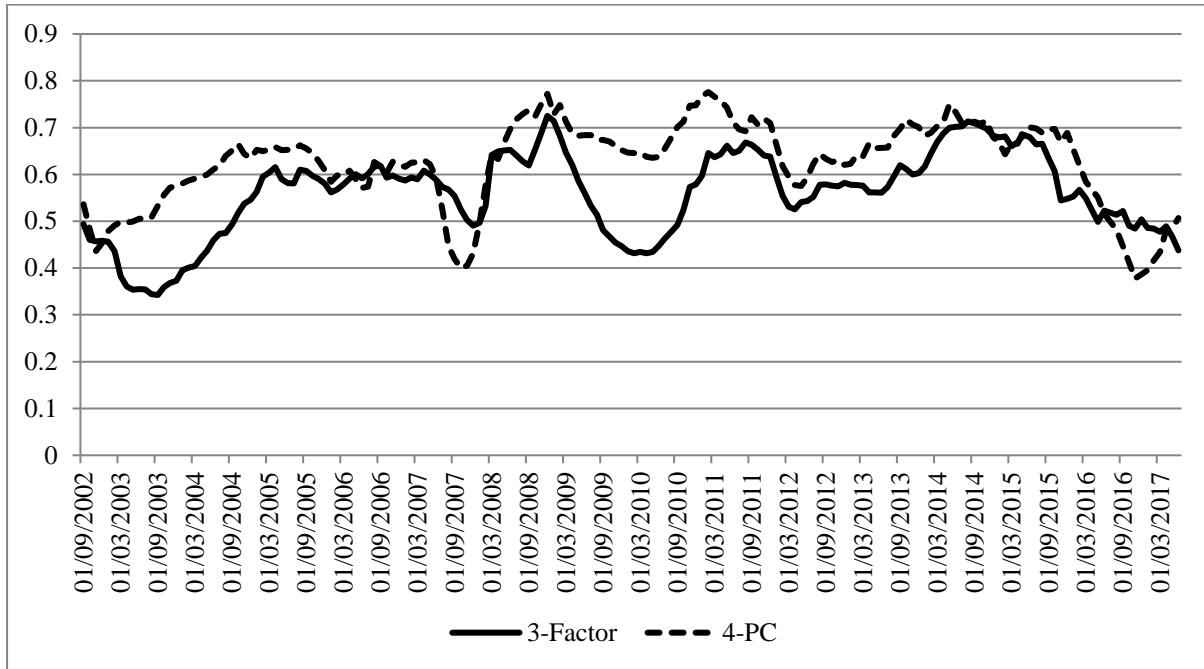
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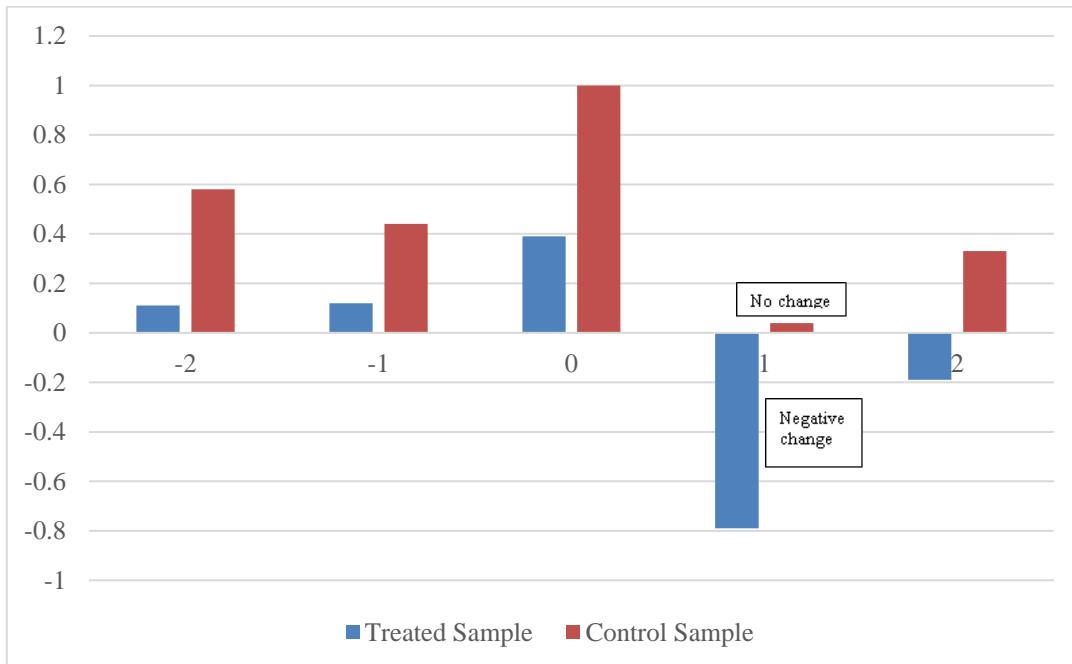
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**Figure 1 - Average  $R^2$**



This figure presents the two time-series of average  $R^2$ 's obtained using CDS excess returns for contracts with a CR restructuring clause, using respectively the 4-PC regressions and the three-factor models. The series run from January 2002 to December 2016.

**Figure 2 –Cumulative change in average CDS-NS**



The figure presents the cumulative change in average CDS-NS over a (-2y, +2y) window around the pro-creditor rights event (i.e., an identified change in law that reinforces creditors control rights), which is indicated as year 0. The cumulative changes are calculated with respect to the Year -3 which is used as base year and, respectively, for firms located in the countries that have witnessed the pro-creditor event at some point in time ('treated sample') and for firms located in European countries that have not adopted such laws/reforms ('control sample').

**Table 1: Informativeness of the CDS nonsynchronicity measure**

This table shows the difference-in-differences analysis of the change in the CDS nonsynchronicity measure around corporate rating downgrades. N is the number of firm/month observations. The control firms are matched (1) on time, (2) on time and country, and (3) on time, country and their Fama-French 12 industry.

<b>Rating Downgrades</b>		
	Pre-event Month	Event Month
<b>Matched on Time</b>	(N=193 vs N=45636)	
Event firms	-0.77	-0.70
Control firms	-0.68	-0.69
Diff	0.09 (1.17)	0.01 (0.11)
Diff-in-diff	0.08*** (2.93)	
<b>Matched on Time and FF12 Industry</b>	(N=193 vs N=7974)	
Event firms	-0.77	-0.70
Control firms	-0.68	-0.64
Diff	0.10 (1.24)	0.04 (0.49)
Diff-in-diff	0.06** (2.08)	
<b>Matched on Time, FF12 Industry, and Country</b>	(N=193 vs N=829)	
Event firms	-0.77	-0.70
Control firms	-0.66	-0.65
Diff	0.11 (1.28)	0.05 (0.58)
Diff-in-diff	0.06* (1.91)	

**Table 2: Sample description**

This table provides the breakdown of our global firm sample by region, country, and sector.

Panel A		
Region	Number of firms	Percentage
Asia	222	23.92
Europe	222	23.92
Latin America	13	1.40
Middle East	9	0.97
North America	462	49.78
Total	928	100
Panel B		
Country	Number of firms	Percentage
Belgium	4	0.43
Brazil	5	0.54
Canada	25	2.69
Chile	5	0.54
Denmark	3	0.32
Finland	7	0.75
France	45	4.85
Germany	34	3.66
Hong Kong	15	1.62
Israel	4	0.43
Italy	16	1.72
Japan	168	18.1
Mexico	22	2.37
Netherlands	3	0.32
Norway	12	1.29
Philippines	5	0.54
Portugal	8	0.86
Singapore	4	0.43
South Korea	9	0.97
Spain	12	1.29
Sweden	9	0.97
Switzerland	12	1.29
Turkey	5	0.54
United Kingdom	59	6.36
United States	437	47.09
Total	928	100
Panel C		
Sector	Number of firms	Percentage
Basic Materials	93	10.02
Consumer Goods	163	17.56
Consumer Services	132	14.22
Financials	137	14.76
Healthcare	42	4.53
Industrials	152	16.38
Oil & Gas	54	5.82
Technology	50	5.39
Telecommunications	42	4.53
Utilities	63	6.79
Total	928	100

**Table 3: Summary statistics of variables in panel regressions**

This table provides the summary statistics for the variables used in the baseline panel regressions.

Panel A: Summary statistics					
	Mean	Std. dev.	Q1	Median	Q3
CDS price nonsynchronicity	-0.69	1.06	-1.43	-0.76	-0.03
Creditor rights	1.64	1.05	1.00	1.00	2.00
Property rights	83.21	9.70	80.00	90.00	90.00
Shareholder rights	4.18	1.18	4.00	5.00	5.00
VIX	0.21	0.10	0.14	0.17	0.24
Total assets (\$bn)	0.08	0.26	0.01	0.02	0.05
Market-to-book	1.45	0.61	1.04	1.24	1.62
Leverage	0.35	0.22	0.17	0.31	0.49
Recovery rate	0.41	0.07	0.36	0.37	0.45
Jump risk	0.01	0.02	0.00	0.00	0.02
Stock price nonsynchronicity	2.47	0.98	1.80	2.37	3.05

Panel B: Creditor Rights Scores by Economy			
Belgium	2	Netherlands	2
Brazil	1	Norway	2
Canada	1	Philippines	0
Chile	2	Portugal	1
Denmark	3	Singapore	4
Finland	1	South Korea	3
France	0	Spain	2
Germany	3	Sweden	2
Hong Kong	4	Switzerland	1
Israel	4	Turkey	2
Italy	2	United Kingdom	4
Japan	2	United States	1
Mexico	0		

**Table 4: Pair-wise correlations**

This table shows the correlation matrix for CDS nonsynchronicity and the macrolevel variables.

	CDS price nonsynchronicity	Creditor rights	Property rights	Shareholder rights	VIX
CDS price nonsynchronicity	1.00				
Creditor rights	-0.03	1.00			
Property rights	0.05	0.06	1.00		
Shareholder rights	0.06	-0.16	0.40	1.00	
VIX	-0.09	0.02	-0.02	-0.01	1.00

**Table 5: Relation between creditor rights and CDS price nonsynchronicity**

**Panel A. Baseline panel regressions**

This table reports the main regression results for how creditor rights affect CDS price nonsynchronicity for the full sample (CR contracts). In Models 1 to 3 the nonsynchronicity measure is based on the monthly-average of CDS spreads and is from the 4-PC model. In Model 4 the nonsynchronicity measure is from the 3-factors model. We estimate the variations of the following baseline model specification:

$$CDSNonSynchronicity_{i,t} = \alpha + \beta CreditorRights_{i,t} + \gamma FirmCountryControls_{i,t} + YearFE + IndustryFE + \varepsilon_{i,t}$$

*Creditor rights* is the composite Creditor Rights Index (*Restrictions on reorganization; No automatic stay; Secured creditor paid first; Management does not stay*, respectively). We calculate *t*-statistics from robust standard errors clustered by country-industry, and we display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity	Model 1	Model 2	Model 3	Model 4
Creditor rights	-0.026*	-0.034**	-0.029**	-0.104***
	(-1.812)	(-2.367)	(-2.003)	(-5.226)
Property rights		0.003**	0.003**	0.018***
		-2.058	-2.128	-6.404
Shareholder rights		0.037***	0.036***	-0.068***
		-3.251	-3.084	(-4.211)
VIX		-0.323*	-0.320*	-1.310***
		(-1.954)	(-1.942)	(-11.251)
Total assets		-0.059	-0.074	-0.075
		(-0.766)	(-0.956)	(-0.979)
Market-to-book		-0.068**	-0.067**	0.023
		(-2.590)	(-2.370)	-0.639
Leverage		0.465***	0.425***	0.084
		-5.127	-4.507	-0.723
Recovery rate		-0.345	-0.393	-0.194
		(-0.654)	(-0.756)	(-0.377)
Jump risk		-0.194	-0.2	-0.444
		(-0.412)	(-0.419)	(-0.759)
Constant	0.193**	-0.079	-	-1.096***
	-2.515	(-0.317)	(-3.548)	(-3.320)
Industry FE	Y	Y	N	N
Year FE	Y	Y	N	N
Industry $\times$ Year FE	N	N	Y	Y
N	71672	71672	71672	75801
Adjusted R <sup>2</sup>	0.112	0.122	0.183	0.203

**Panel B: Relationship between creditor-rights subcomponents and CDS price nonsynchronicity**

This table reports the regression results on the relationship between the four components of creditor rights (*Restrictions on reorganization; No automatic stay; Secured creditor paid first; Management does not stay*) and CDS price nonsynchronicity for the full sample (CR contracts). The nonsynchronicity measure is based on the monthly-average of CDS spreads and is from the 4-PC model. We calculate *t*-statistics from robust standard errors clustered by country-industry; they are in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity	Model 1	Model 2	Model 3	Model 4	Model 5
Restrictions on reorganization	-0.124*** (-3.239)				-0.091* (-1.716)
No automatic stay		-0.119*** (-3.184)			-0.084 (-1.399)
Secured creditor paid first			0.114* (1.783)		0.162** (2.480)
Management does not stay				-0.033 (-0.887)	-0.002 (-0.055)
Property rights	0.005*** (2.831)	0.004*** (2.616)	0.002 (1.054)	0.002 (1.422)	0.004* (1.833)
Shareholder rights	0.022* (1.759)	0.028** (2.266)	0.038*** (3.418)	0.043*** (3.833)	0.013 (0.956)
VIX	-0.316* (-1.917)	-0.323* (-1.956)	-0.317* (-1.923)	-0.319* (-1.941)	-0.321* (-1.953)
Total assets	-0.077 (-1.010)	-0.063 (-0.827)	-0.053 (-0.676)	-0.069 (-0.897)	-0.049 (-0.620)
Market-to-book	-0.064** (-2.280)	-0.067** (-2.350)	-0.059** (-2.089)	-0.065** (-2.266)	-0.069** (-2.405)
Leverage	0.419*** (4.443)	0.419*** (4.430)	0.425*** (4.535)	0.429*** (4.558)	0.407*** (4.347)
Recovery rate	-0.409 (-0.792)	-0.366 (-0.704)	-0.394 (-0.770)	-0.394 (-0.758)	-0.423 (-0.815)
Jump risk	-0.232 (-0.484)	-0.182 (-0.384)	-0.237 (-0.495)	-0.211 (-0.443)	-0.201 (-0.424)
Constant	-0.951*** (-3.857)	-0.958*** (-3.853)	-0.929*** (-3.760)	-0.875*** (-3.368)	-0.957*** (-3.649)
Industry × Year FE	Y	Y	Y	Y	Y
N	71672	71672	71672	71672	71672
Adjusted R <sup>2</sup>	0.184	0.184	0.183	0.182	0.185

**Table 6: Subsample analysis**

**Panel A: Relation between creditor rights and CDS price nonsynchronicity conditional upon firm risk and investments**

This table reports the regression results for the relation between creditor rights and CDS price nonsynchronicity conditional upon firms' credit rating, investment intensity, and asset growth. We calculate *t*-statistics from robust standard errors clustered by country-industry, and we display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity	Model 1: Investment grade		Model 2: Capex intensity		Model 3: Asset growth		Model 4: PPE growth	
	Yes	No	Q1-Q4	Q5	Q1-Q4	Q5	Q1-Q4	Q5
			Diff	Diff	Diff	Diff	Diff	Diff
Creditor rights	0.023 (1.171)	-0.084*** (-3.161)	-0.038** (-2.239)	-0.095** (-2.565)	-0.016 (-1.015)	-0.084*** (-3.374)	-0.008 (-0.539)	-0.128*** (-4.535)
			-0.106***	-0.056*		-0.074***		-0.115***
Property rights	0.001 (0.494)	0.005* (1.871)	0.002 (0.974)	0.008** (2.296)	0.003* (1.803)	0.006** (2.250)	0.004** (2.122)	0.002 (0.869)
Shareholder rights	0.005 (0.299)	0.008 (0.301)	0.040*** (3.004)	0.028 (0.795)	0.034** (2.535)	0.029 (1.213)	0.044*** (3.612)	0.019 (0.654)
VIX	-0.351* (-1.821)	-0.328 (-1.463)	-0.266 (-1.438)	-0.505 (-1.510)	-0.489*** (-2.732)	0.588** (2.350)	-0.426** (-2.422)	0.022 (0.083)
Total assets	0.047 (0.588)	-0.351*** (-3.181)	-0.290* (-1.887)	0.114 (0.153)	-0.111 (-1.225)	0.019 (0.279)	-0.079 (-1.170)	0.010 (0.063)
Market-to-book	-0.109* (-1.803)	-0.087** (-2.473)	-0.043 (-1.436)	-0.213*** (-3.104)	-0.044 (-1.532)	-0.096 (-1.543)	-0.033 (-0.991)	-0.142** (-2.581)
Leverage	0.307** (2.040)	0.445*** (3.603)	0.459*** (4.142)	0.348 (1.047)	0.423*** (4.216)	0.382** (2.019)	0.442*** (4.547)	0.465** (2.448)
Recovery rate	-0.643 (-1.035)	-0.376 (-0.510)	-0.540 (-1.007)	0.370 (0.277)	-0.125 (-0.254)	-0.749 (-0.678)	-0.527 (-0.844)	0.196 (0.288)
Jump risk	-0.944 (-1.325)	0.559 (0.905)	0.106 (0.198)	0.301 (0.277)	0.262 (0.560)	-2.953*** (-3.238)	0.338 (0.707)	-1.774** (-2.031)
Constant	-0.592* (-1.943)	-0.800** (-2.088)	-0.756*** (-2.800)	-1.170* (-1.893)	-1.020*** (-4.046)	-0.885* (-1.747)	-0.973*** (-3.550)	-0.733* (-1.884)
Year $\times$ Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
N	28443	43229	53050	12895	57370	14291	56387	14056
Adjusted R <sup>2</sup>	0.261	0.212	0.200	0.293	0.194	0.310	0.199	0.287

**Panel B: Relation between creditor rights and CDS price nonsynchronicity conditional upon investment intensity and information asymmetry**

This table reports the regression results for the relation between *Creditor rights* and CDS price nonsynchronicity conditional upon investment intensity and information asymmetry, proxied by the bid-ask spread and the Amihud illiquidity measure. We calculate *t*-statistics from robust standard errors clustered by country-industry, and we display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity	Q5 Capex intensity &			
	Q1-Q4 Bidask	Q5 Bidask	Q1-Q4 Amihud	Q5 Amihud
Creditor rights	-0.050 (-1.407)	-0.484*** (-6.341)	-0.116*** (-3.185)	-0.298*** (-2.861)
		Diff -0.410***		Diff -0.200**
Property rights	0.005 (1.193)	0.019 (1.541)	0.003 (0.501)	0.002 (0.357)
Shareholder rights	0.049 (1.351)	0.049 (0.471)	0.050 (1.081)	0.161*** (2.757)
VIX	-0.213 (-0.730)	-1.965** (-2.565)	-0.297 (-0.844)	-1.622*** (-2.886)
Total assets	-0.202 (-0.217)	3.130 (0.921)	-0.068 (-0.085)	-1.966 (-0.252)
Market-to-book	-0.242*** (-2.998)	-0.229 (-1.073)	-0.176** (-2.298)	-0.986** (-2.157)
Leverage	0.213 (0.481)	0.562 (1.124)	0.351 (0.815)	-1.923 (-1.323)
Recovery rate	-0.784 (-0.546)	3.647* (1.692)	-1.371 (-0.842)	8.310*** (2.837)
Jump risk	-1.219 (-0.990)	7.168*** (3.879)	-0.461 (-0.387)	4.386 (1.332)
Constant	-0.493 (-0.803)	-2.714** (-2.206)	-0.106 (-0.150)	-1.935** (-2.073)
Year $\times$ Industry FE	Y	Y	Y	Y
N	10401	2044	10543	1909
Adjusted R <sup>2</sup>	0.315	0.455	0.294	0.584

**Table 7: The DID analysis of pro-creditor-rights reforms  
on CDS price nonsynchronicity**

This table reports the results of CDS price nonsynchronicity regressed on an indicator for whether the CDS firm's country adopts a bankruptcy law reform that strengthened creditor-control rights. Eleven countries adopt pro-creditor bankruptcy reforms during our sample period (see appendix for details of the reforms). We calculate *t*-statistics from robust standard errors clustered by country-industry and display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Specifications	Dep. = CDS Price Nonsynchronicity				
	(1)	(2)	(3)	(4)	(5)
Pro-creditor rights event	-0.287*** (-5.175)	-0.260*** (-4.535)	-0.243*** (-4.322)	-0.253** (-2.502)	-0.278** (-2.840)
Property rights		0.003* (1.682)	0.003* (1.853)		
Shareholder rights		0.023** (2.058)	0.022** (1.978)		
VIX		-0.326** (-1.970)	-0.323* (-1.955)	-0.344** (-2.093)	-0.362** (-2.116)
Total assets		-0.058 (-0.779)	-0.080 (-1.087)	-0.061 (-0.783)	-0.042 (-0.547)
Market-to-book		-0.053** (-1.988)	-0.054* (-1.911)	-0.068** (-2.373)	-0.060** (-1.977)
Leverage		0.477*** (5.245)	0.440*** (4.658)	0.405*** (4.323)	0.407*** (3.920)
Recovery rate		-0.287 (-0.549)	-0.345 (-0.668)	-0.454 (-0.888)	-0.439 (-0.858)
Jump risk		-0.159 (-0.338)	-0.167 (-0.353)	0.028 (0.061)	0.184 (0.382)
GDP per capita					0.066*** (4.929)
Stock price nonsynchronicity					0.009 (0.770)
Amihud					0.003 (0.308)
Constant	0.152** (2.101)	-0.055 (-0.222)	-0.862*** (-3.469)	-0.314 (-1.233)	-2.866*** (-5.026)
Industry FE	Y	Y	N	N	N
Year FE	Y	Y	N	N	N
Year $\times$ Industry FE	N	N	Y	Y	Y
Country FE	N	N	N	Y	Y
N	71672	71672	71672	71672	67928
Adjusted R <sup>2</sup>	0.116	0.124	0.185	0.195	0.197

**Table 8: The DID analysis of pro-creditor rights reforms on leverage and risk-taking variables**

Column (1) to (4) reports the DID analysis results of leverage, capex intensity, asset growth, and CDS price non-synchronicity regressed on an indicator of whether the CDS firm's country adopts bankruptcy law reforms that strengthen creditor-control rights by month. Eleven countries adopt pro-creditor bankruptcy reforms during our sample period (see the appendix for details of the reforms). We calculate *t*-statistics from robust standard errors clustered by country-industry; they are in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively. The specifications used for each dependent variable are the ones in the last column of table 7.

Specifications:	(1)	(2)	(3)	(4)
Dependent variables	Leverage	Capex	Asset growth	CDS-NS
Pro-creditor rights event	0.013 (0.752)	0.003 (1.076)	-0.020 (-0.597)	-0.458*** (-5.157)
VIX	-0.056*** (-6.013)	0.004** (2.303)	0.019* (2.217)	-0.339* (-1.863)
Total assets	0.083*** (3.307)	-0.007 (-0.693)	0.044*** (3.685)	-0.285* (-1.755)
Market-to-book	-0.145*** (-10.037)	0.004** (2.680)	0.009 (1.179)	-0.069** (-2.274)
Leverage		-0.004 (-0.550)	-0.028 (-0.880)	0.401*** (3.660)
Recovery rate	-0.246** (-2.007)	0.006 (0.217)	0.116 (1.235)	-0.463 (-0.884)
Jump risk	0.562*** (6.952)	-0.040*** (-3.024)	-0.140** (-1.977)	0.337 (0.671)
GDP per capita	-0.002 (-1.025)	0.001 (1.389)	-0.001 (-0.403)	0.057*** (4.251)
Stock price nonsynchronicity	-0.005** (-2.119)	-0.000 (-0.182)	0.003 (0.889)	0.009 (0.692)
Amihud	-0.002 (-0.129)	-0.004 (-1.498)	-0.009 (-0.847)	0.043 (0.408)
Capex intensity				-0.194 (-0.446)
Asset growth				-0.016 (-0.504)
Constant	0.773*** (7.424)	0.026 (1.339)	0.057 (0.509)	-2.492*** (-4.403)
Year $\times$ Industry FE	Y	Y	Y	Y
Country FE	Y	Y	Y	Y
N	67928	62852	67917	62841
Adjusted R <sup>2</sup>	0.642	0.556	0.143	0.203

**Table 9: Robustness checks**

**Panel A: Event-study with PSM: DID analysis of pro-creditor rights reforms on CDS price nonsynchronicity**

This table reports the results of CDS price nonsynchronicity regressed on an indicator for whether the CDS firm's country adopts a bankruptcy law reform that strengthens creditor-control rights. Eleven countries adopt pro-creditor bankruptcy reforms during our sample period (see the appendix for all reform details). We perform the regression using an event-window cohort approach and a propensity-score matched sample. First, for each event ("cohort") we divide firms into two groups: 1) firms in countries that change creditor-rights laws in that cohort (treatment group); 2) firms in countries that had no change in creditor-rights law in that cohort (control group). Next, to identify a control group of firms with similar characteristics as the firms in the treatment group, we use propensity score matching (PSM) based on all the control variables in table 7. Finally, we look at the respective changes in CDS-NS in the two groups over the window of two years before to two years after the event. We calculate *t*-statistics from robust standard errors clustered by country-industry, and we display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity

	(1)	(2)	(3)	(4)
Specifications				
Pro-creditor rights event	-0.652*** (-4.788)	-0.501*** (-3.987)	-0.681*** (-4.564)	-0.487*** (-2.894)
Property rights		-0.015** (-2.021)	-0.023*** (-2.888)	
Shareholder rights		0.080 (1.639)	0.093* (1.794)	
VIX		-0.333 (-0.791)	-0.277 (-0.670)	-0.389 (-0.953)
Total assets		0.283* (1.780)	-0.156 (-1.093)	-0.141 (-1.077)
Market-to-book		0.053 (0.450)	0.090 (0.508)	-0.023 (0.130)
Leverage		0.878** (2.356)	0.382 (0.865)	-0.389 (-0.939)
Recovery value		2.145 (1.165)	0.976 (0.419)	2.610 (1.262)
Jump risk		-0.160 (-0.118)	0.206 (0.206)	1.265 (1.060)
GDP per capita		0.017 (1.259)	0.026* (1.769)	-0.051 (-0.991)
Stock price nonsynchronicity		-0.018 (-0.379)	-0.048 (-0.869)	-0.009 (-0.160)
Amihud		-0.057 (-1.080)	-0.170*** (-2.815)	-0.139*** (-4.167)
Constant	-0.527** (-2.095)	-2.095* (-1.781)	0.091 (0.070)	1.674 (1.330)
Cohort FE	Y	Y	Y	Y
Year FE	Y	Y	N	N
Industry FE	Y	Y	N	N
Industry $\times$ Year FE	N	N	Y	Y
Country FE	N	N	N	Y
N	5597	5520	5520	5520
Adjusted R <sup>2</sup>	0.256	0.283	0.500	0.543

### Panel B: Event-study with PSM: Tests for alternative channels

This table tests three alternative channels, i.e., dealers' lower attention using the post-GFC sub-sample in column 1, changes in CDS market size in column 2, and lower triggering event uncertainty using CDS contracts with XR clauses in column 3. CDS price nonsynchronicity is regressed on an indicator for whether the CDS firm's country adopts a bankruptcy law reform that strengthens creditor-control rights. Eleven countries adopt pro-creditor bankruptcy reforms during our sample period (see the appendix for all reform details). We perform the regression using an event-window cohort approach and a propensity-score matched sample. First, for each event ("cohort") we divide firms into two groups: 1) firms in countries that change creditor-rights laws in that cohort (treatment group); 2) firms in countries that had no change in creditor-rights law in that cohort (control group). Next, to identify a control group of firms with similar characteristics as the firms in the treatment group, we use propensity score matching (PSM) based on all the control variables in table 7. Finally, we look at the respective changes in CDS-NS in the two groups over the window of two years before to two years after the event. We calculate *t*-statistics from robust standard errors clustered by country-industry, and we display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity	CR Sample		XR Sample
	(1)	(2)	
Pro-creditor rights event	-0.573*** (-2.815)	-0.437** (-2.210)	-0.535*** (-3.011)
VIX	-1.112** (-2.420)	-1.998*** (-2.817)	0.007 (0.786)
Total assets	-0.167 (-1.169)	-0.035 (-0.295)	0.002 (0.296)
Market-to-book	-0.184 (-1.142)	-0.156 (-0.895)	-0.125 (-0.207)
Leverage	-0.444 (-1.016)	0.023 (0.041)	-2.683 (-1.220)
Recovery value	2.219 (0.991)	3.380 (1.221)	-0.281 (-0.993)
Jump risk	1.874 (1.507)	2.569 (1.460)	-0.026 (-1.613)
GDP per capita	0.094 (0.881)	0.113 (0.670)	-0.054 (-0.885)
Stock price nonsynchronicity	-0.054 (-0.770)	-0.104 (-1.344)	0.104 (0.848)
Amihud	-0.122*** (-3.579)	-0.124*** (-3.652)	0.231 (0.468)
CDS market size		0.552*** (2.975)	
Constant	-0.017 (-0.009)	-17.066*** (-2.700)	10.685** (2.474)
Cohort FE	Y	Y	Y
Year x Industry FE	Y	Y	Y
Country FE	Y	Y	Y
N	4102	2766	1323
Adjusted R <sup>2</sup>	0.519	0.488	0.656

### Panel C: Event-study with PSM: DID analysis of pro-creditor rights reforms on CDS price nonsynchronicity with European control firms

This table reports the DID analysis based on event-study with PSM with *European control firms*. Column 1-4 is based on the CR sample, and column 5 is based on the XR sample. CDS price nonsynchronicity is regressed on an indicator for whether the CDS firm's country adopts a bankruptcy law reform that strengthens creditor-control rights. Eleven countries adopt pro-creditor bankruptcy reforms during our sample period (see the appendix for all reform details). We perform the regression using an event-window cohort approach and a propensity-score matched sample. First, for each event ("cohort") we divide firms into two groups: 1) firms in countries that change creditor-rights laws in that cohort (treatment group); 2) firms in European countries that had no change in creditor-rights law in that cohort (control group). Next, to identify a control group of firms with similar characteristics as the firms in the treatment group, we use propensity score matching (PSM) based on all the control variables in table 7. Finally, we look at the respective changes in CDS-NS in the two groups over the window of two years before to two years after the event. We calculate *t*-statistics from robust standard errors clustered by country-industry, and we display them in parentheses. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Dep. = CDS Price Nonsynchronicity	CR Sample				XR Sample
Specifications	(1)	(2)	(3)	(4)	(5)
Pro-creditor rights event	-0.688*** (-4.085)	-0.642*** (-3.825)	-0.636*** (-2.830)	-0.411* (-1.862)	-0.608** (-2.647)
Property rights		0.014* (1.703)	0.015* (1.716)		
Shareholder rights		-0.061 (-0.828)	0.033 (0.381)		
VIX		0.055 (0.110)	0.195 (0.409)	-0.011 (-0.024)	-0.001 (-0.198)
Total assets		0.371** (2.519)	-0.200 (-1.360)	-0.174 (-1.301)	0.002 (0.955)
Market-to-book		0.034 (0.152)	0.059 (0.168)	-0.920*** (-2.983)	0.742 (1.124)
Leverage		0.574 (1.022)	-0.329 (-0.504)	-1.750*** (-2.710)	2.855 (1.564)
Recovery value		5.238** (2.248)	5.002** (2.101)	10.176*** (7.788)	0.010 (0.434)
Jump risk		-0.051 (-0.030)	-1.484 (-1.360)	0.392 (0.398)	0.021 (1.621)
GDP per capita		-0.009 (-0.401)	-0.006 (-0.418)	0.121 (1.155)	0.048 (0.157)
Stock price nonsynchronicity		-0.016 (-0.352)	0.050 (0.654)	0.142** (2.095)	-0.011 (-0.113)
Amihud		-0.022 (-0.229)	-0.127*** (-5.512)	-0.159*** (-7.774)	0.033*** (3.987)
Constant	0.624* (1.677)	-2.464* (-1.713)	-4.455*** (-2.822)	-6.535 (-1.621)	-4.840 (-0.433)
Cohort FE	Y	Y	Y	Y	Y
Year FE	Y	Y	N	N	N
Industry FE	Y	Y	N	N	N
Industry $\times$ Year FE	N	N	Y	Y	Y
Country FE	N	N	N	Y	Y
N	4283	4283	4283	4283	963
Adjusted R <sup>2</sup>	0.317	0.335	0.582	0.623	0.584

**Table A1: The NUS-RMI dataset and the CDS excess returns**

The NUS-RMI database includes over 60,000 publicly-listed firms from 117 countries across the globe (of these firms at least 30,000 have sufficient data to release daily updated probability of default).<sup>39</sup> The proprietary database that underlies this output includes extensive panel data on firm stock price, financial statement data, and default events from 1990 to the present, categorized by default class. The RMI probabilities of default (PDs) are similar to the expected default frequencies (EDF) computed by Moody's KMV. However, the RMI default forecasts depend on a richer information set, including financial ratios besides the distance to default as predictors. Furthermore, the RMI system uses a completely transparent methodology described in a detailed 2015 RMI technical report, which is continuously updated; the RMI-NUS database is free and publicly accessible (after user registration).

Default events are from numerous sources, including Bloomberg, Compustat, CRSP, Moody's, exchange websites, and media outlets. The recognized default events include: 1) bankruptcy filing, receivership, administration, liquidation, or any other legal impasse to the timely settlement of interest and/or principal payments; 2) a missed or delayed payment of interest and/or principal, excluding delayed payments made within a grace period; and 3) debt restructuring/distressed exchange, in which debt holders are offered a new security or package of securities that result in a diminished financial obligation (e.g., a conversion of debt to equity, debt with lower coupon or par value, debt with lower seniority, debt with longer maturity).

Delistings or "other exits" (due, for example, to a failure to meet listing requirements, inactive stocks, or M&A) are not defaults initially but are reclassified as defaults if a firm experiences a default within one year of delisting. Technical defaults (i.e., covenant violations) are not included in the definition of default. NUS-RMI provides, on a monthly and firm-by-firm basis, conditional default probabilities for different horizons. These probabilities of default are estimated from a reduced-form model (Duan, Sun, and Wang, 2012), which extends the models of Duffie, Saita, and Wang (2007). They are forward-looking measures of firms' likelihood of default (over various future horizons), estimated in the physical domain (i.e., under real-world measures).

Expected CDS excess returns, as in Bongaerts, De Jong, and Driessen (2011), are the sum of the net expected discounted cash-flows from CDS contracts, where the discount rate is equal to the risk-free rate and expectations are based on this real-world probability measure.

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<sup>39</sup> We use the 2017 version of the NUS-RMI database.

We match firms in the NUS-RMI and IHS Markit datasets. Because the two datasets do not use common identifiers (tickers, company numbers, etc.), we match firms by name first using a score algorithm that measures the name strings' similarity. After a careful analysis, we select a score threshold and include all matched names with a score equal or inferior to the threshold. Next, we manually eliminate wrong matches and look at ambiguous matches due to different "legal" classification in IHS Markit and NUS, name changes over time (e.g., SES Ltd, SES plc, SES Inc., SES Corp., etc.) because of spin-offs, M&A, changes in structure, ownership changes, etc. We ensure that the matched firms in the NUS and IHS Markit databases have the same country of domicile. We also ensure that parent companies are never matched with their subsidiaries. If the name or legal classification of a firm changes over time, we assign the firm the most recent name.

The NUS-RMI database provides monthly estimates of conditional probabilities of default ( $PD$ ) for each firm at the 1, 3, 6, 12, 24, 36, and 60-month horizon. We complete the three-months-ahead  $PD$  estimates term-structure by linear interpolation. Next, for each firm and for each month  $t$ , we then calculate the cumulative default probabilities at the  $j/4$  year-horizon until maturity  $T$  (for  $j=1, \dots, 4T$ ) as:

$$CDP_t\left(\frac{j}{4}\right) = PD_t\left(\frac{j-1}{4}\right) + PD_t\left(\frac{j}{4}\right) \left[1 - PD_t\left(\frac{j-1}{4}\right)\right]$$

and the survival probabilities as:

$$SVP_t\left(\frac{j}{4}\right) = 1 - CDP_t\left(\frac{j}{4}\right)$$

For each firm's five-year CDS contract, we calculate expected excess CDS returns for month  $t$ ,  $E(R_{CDS_t}^e)$ , assuming that the CDS premia are paid in arrears quarterly (which is the most common case):

$$E(R_{CDS_t}^e) = CDS_t A(T) - L \sum_{i=1}^{20} \left[ CDP\left(\frac{j}{4}\right) - CDP\left(\frac{j-1}{4}\right) \right] B_t\left(\frac{j}{4}\right) \quad (A1)$$

where:

- $A(T) = \frac{1}{4} \sum_{j=1}^{4T} SVP_t\left(\frac{j}{4}\right) B_t\left(\frac{j}{4}\right)$
- $B_t\left(\frac{j}{4}\right) = \frac{1}{(1+y_t)^{j/4}}$  is the discount factor;  $y_t$  is the three-month T-Bill yield in month  $t$ ;
- $L$  is the expected loss rate in case of default (i.e., 1 minus the recovery rate, which varies by sector but not across countries or over time).

$E(R_{CDS_t}^e)$  is the unconditional expected excess return to maturity on the CDS contract (measured in %). It is the sum of all expected cash-flows paid to the CDS seller (when the buyer holds the CDS contract until the maturity of five years (20 quarters), minus expected cash-flows the seller pays in the case of default, discounted at the risk-free rate (the three-month T-Bill yield). The excess returns represent an estimate of the extra compensation the CDS seller requests from the CDS buyer for protection against the credit risk of the underlying firm's debt.

Favara et al. (2017) argue that recovery rates vary mainly by industry rather than by country or over time. Similarly, we adopt the industry recovery rates from Altman and Kishore (1996), supplemented by the recovery rates from Mora (2012) and Jankowitsch, Nagler, and Subrahmanyam (2014). Altman and Kishore (1996) generate a breakdown of recovery rates by industry based on 696 defaulted U.S. bonds over the period 1975-1995. The detailed industry classification matches well with the IHS Markit sector-classification. Mora (2012) and Jankowitsch et al. (2014) produce U.S. recovery rates by industry, using information from Moody's default rate for a larger sample of defaults (4,422) over 1970-2008 and for 2,235 defaulted bonds reported in the TRACE database over 2002–2010, respectively. However, the classification by industry in the above two papers is less detailed. Therefore, we mainly rely on the mean recovery rates from Altman and Kishore (1996), with slight readaption to map the IHS Markit sector classification (see table A3). The mean recovery rates for most industries (such as industrials, consumer services, consumer goods, financials, and telecommunications) are very close to the recovery rates in the two more recent papers (Mora, 2012, and Jankowitsch et al., 2014).<sup>40</sup>

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<sup>40</sup> For the utilities and oil & gas sectors, we use the recovery rates from Mora (2012) for two reasons: i) Altman and Kishore (1996) produce mean recovery rates that are much higher than in Mora (2012) and Jankowitsch et al., (2014); ii) Mora (2012) obtains values using the highest number of defaulted bonds: 164 versus 39 in Jankowitsch et al., (2014) and 56 in Altman and Kishore (1996). For the government sector we use the highest recovery rate for the classification of public utilities reported by Altman and Kishore (1996).

**Table A2: Obtaining R-squared from the three-factor model**

Suppose a given firm  $j$  is based in country  $i$  within region  $k$ . We regress firm  $j$ 's CDS excess returns at month  $t$  on three different sources of systematic risk arising separately from firm  $j$ 's own country, its region  $k$ , and the rest of the world. By performing this regression, we can evaluate how much each firm's CDS excess return co-moves with country, regional, and global-risk premia. The  $R^2$  captures all common sources of information incorporated in firm  $j$ 's CDS excess returns. The  $1 - R^2$  instead measures the component of CDS excess returns that does not co-move with the country, regional, and global-risk premia. Hence, it isolates the component relating only to idiosyncratic firm-specific risk.

$$R_{CDS,j,i,t}^e = \alpha_{i,t} + \beta_{j,t} R_{CDS,country\,i,t}^e + \gamma_{j,t} R_{CDS,region\,k,t}^e + \delta_{j,t} R_{CDS,rest-of-world,t}^e + \varepsilon_{j,i,t} \quad (A2)$$

where:

$R_{CDS,j,i,t}^e$  : Firm  $j$ 's CDS excess returns in month  $t$  (firm  $j$  in country  $i$ ).

$R_{CDS,country\,i,t}^e$  : country  $i$ 's equally weighted average CDS excess return in month  $t$  (country  $i$  portfolio; with  $R_{CDS,j,t}^e$  being excluded from the country portfolio).

$R_{CDS,region\,k,t}^e$  : Region  $k$ 's equally weighted average CDS excess return in month  $t$  (region  $k$  portfolio; with the CDS excess returns for all firms based in country  $i$  being excluded from the average).

$R_{CDS,rest-of-world,t}^e$  : Global equally weighted average CDS excess return in month  $t$  (global portfolio; with the CDS excess returns for all firms based in region  $k$  being excluded from the global portfolio).

For each month  $t$ , we obtain country  $i$ 's portfolio CDS excess return,  $R_{CDS,country\,i,t}^e$ , by taking an equally weighted average of all CDS excess returns for reference entities based in the same country  $i$ . However, this average excludes the CDS excess return of firm  $j$ ,  $R_{CDS,j,i,t}^e$ . We obtain the regional portfolio CDS excess return for each month  $t$ ,  $R_{CDS,region\,k,t}^e$ , by computing the equally weighted average of all CDS excess returns for all reference entities based in region  $k$ , except those in country  $i$ . We obtain the rest-of-the-world portfolio CDS excess return for each month  $t$ ,  $R_{CDS,rest-of-world,t}^e$ , by computing the equally weighted average of all CDS excess returns for all reference entities in the world, except those based in region  $k$ .

**Table A3: Recovery rates**

This table provides the recovery rates by sector, compiled from several sources (Altman and Kishore, 1996; Mora, 2012 and Jankowitsch, Nagler, and Subrahmanyam, 2014).

IHS Markit sector classification	Recovery rate (L)
Basic materials	45.25
Consumer goods	35.17
Consumer services	37.36
Financials	35.54
Government	70.47
Healthcare	50.00
Industrials	40.79
Oil & gas	50.80
Technology	48.74
Telecommunications	37.08
Utilities	57.50

**Table A4: Definitions of variables**

Variable name	Variable definition	Source
<i>CDS nonsynchronicity</i>	Log ratio of ( $1-R\text{-square}$ ) over R-square, from alternative asset-pricing model specifications.	Authors' calculations
<i>Creditor rights</i>	A composite measure of country-level creditor rights. It is the sum of the four indexes: no automatic stay, reorganization, secured debt first, and no management stay. The score ranges from zero (weak creditor rights) to 4 (strong creditor rights).	Djankov et al. (2007)
<i>Property rights</i>	A composite measure of country-level property rights. The value ranges from 1 to 100. Higher values indicate better property rights.	La Porta et al. (1998)
<i>Shareholder rights</i>	An index that aggregates shareholder rights. The index is formed by adding one when: (1) the country allows shareholders to mail a proxy vote to the firm, (2) shareholders are not required to deposit shares prior to the general shareholders' meeting, (3) cumulative voting or proportional representation of minorities in the board of directors is allowed, (4) an oppressed minorities mechanism is in place, (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10% (the sample median), or (6) shareholders have preemptive rights that can be waived only by a shareholders' vote. The index ranges from zero to 6.	Quotation is from La Porta et al. (1998)
<i>VIX</i>	CBOE Volatility Index, which measures the stock market's expectation of volatility, implied by S&P 500 index options.	Chicago Board Options Exchange

<i>Recovery rate</i>	Mean industry-level recovery rates from Altman and Kishore (1996), with slight readaption to map the IHS Markit sector classification.	IHS Markit, Altman and Kishore (1996)
<i>Total assets (\$USbn)</i>	Firm's total assets in U.S. dollars.	Compustat Global
<i>Market-to-book</i>	Market value of equity divided by book value of equity.	Compustat Global
<i>Leverage</i>	Book value of debt divided by the sums of book value of debt and market value of equity.	Compustat Global
<i>Jump risk</i>	Number of days in each month when the absolute change in each firm's five-year CDS spread ( $spd5y_t - spd5y_{t-1}$ ) is above its 95th percentile value with respect to its whole sample.	IHS Markit and authors' calculations
<i>Capex intensity</i>	Measures a firm's efficiency in deploying assets, computed as a ratio of the total value of assets to sales revenue over a given year.	Compustat Global
<i>Bid-ask spread</i>	Daily stock ask price minus bid price all, divided by the mean of the ask and bid price for the year.	Compustat Global
<i>Amihud</i>	Average daily absolute value of stock returns, divided by the dollar value of trading volume.	Compustat Global
<i>Stock price nonsynchronicity</i>	Log ratio of ( $I-R$ -square) over R-square, from a market model based on the firm's stock returns.	Authors' calculations
<i>Ln (Number of procedures to enforce contracts)</i>	The natural log of the average number of procedures (direct interactions between parties, or between the parties and the judge or court officer) required to enforce legal contracts within the firm's country.	World Bank's Doing Business Survey
<i>Ln (Time to enforce contracts)</i>	The natural log of the average time (number of calendar days) required to resolve payment disputes through the court system within the firm's country.	World Bank's Doing Business Survey
<i>Ln (Cost of enforce contracts)</i>	The natural log of the average cost for lawyers, court proceedings, and enforcement costs (as a percentage of the debt) for enforcing legal contracts within the firm's country.	World Bank's Doing Business Survey
<i>Corruption</i>	The index value (between 0 and 100) for the degree of corruption perceived within the firm's country. Low scores indicate that government officials are likely to demand special illegal payments (bribes).	International Country Risk Guide (ICRG)
<i>Ethnic fractionalization</i>	The degree of ethnolinguistic fractionalization within the firm's country. Its value is between 0 and 1.	La Porta et al. (1999)
<i>Legal origin</i>	A dummy variable that identifies the legal origin of the company law or commercial code of each country.	La Porta et al. (1999)
<i>GDP per capita</i>	Categories are common law, French civil law, German civil law and Other. Logarithm of gross national product per capita.	World Development Indicators

**Table A5: Descriptions of country-level pro-creditor bankruptcy law reforms**

(Source: Hasan, John, and Kadiyala, 2018 and authors' own efforts from legal web searches)

**Netherlands:** Inspired by neighbouring Western European countries to reform its insolvency laws, Netherlands commissioned a Committee for the Modernization of Bankruptcy called the MDW. The parliament adopted the findings of this committee by issuing an amendment, Bill 27 244, in 2002, which went into effect in 2003.<sup>41</sup>

Treatment of creditors: Secured creditors, especially those holding mortgages and pledges on assets, have been granted increased powers to seize collateral and are not subject to priority rules. Unsecured creditors are required to file claims against an administrator. In the event of liquidation, new priority rules grant the highest priority to estate claims. This category of claimants can also include debtor-in-possession (DIP) financing. The second highest priority is given to preferred credits, which are credits established prior to bankruptcy. Unsecured creditors have the lowest priority.

Treatment of creditors in restructuring: The new law prohibits firms from laying off employees during restructuring negotiations. Out-of-court restructuring requires majority approval of secured creditors. Unsecured creditors are subject to cramdowns of restructuring plans that emerge from negotiations.

Treatment of firm in a restructuring: When a firm files for bankruptcy, the court suspends payments and appoints an administrator to oversee operations of the firm, replacing current management. Courts can clawback payments the firm made before filing for bankruptcy. Director liabilities are imposed for fraud or for poor decision making.

The amendment to existing law strengthens the rights of senior collateralized debtholders by giving them greater power to seize collateral. By forcing a cramdown on unsecured creditors and moving DIP lenders and court costs up in APR to take precedence over unsecured credit, the new law is unfriendly to unsecured credit, instead encouraging restructuring on terms favorable to secured lenders. By appointing an administrator and imposing stiff penalties on directors, the law discourages expropriation by management.

**Portugal:** A new legislation, Decree-law 53/2004 of March 18, 2004, as amended by Decree Law 200/2004 of August 18, 2004, deals with insolvencies and the proliferation of bankruptcy among small businesses following the 2001 recession. The new law establishes a single main insolvency proceeding called *processo de insolvencia*, which leads either to liquidation or restructuring of the insolvent company.

Filing for bankruptcy: Debtors or creditors can file for insolvency proceedings. Directors have to file within 60 days of acquiring information that the company may become insolvent; they can face penalties for failure to do so. The court appoints an administrator, who takes control

<sup>41</sup> Press release from the Council of Ministers on November 23, 2001. Sources include Janssen, M.A.J.G., A.S.K. Terng, and J.M. van der Wulp, eds., "Bankruptcy and a Fresh Start: Stigma on Failure and Legal Consequences of Bankruptcy – the Dutch Report," February 2002, and the actual legislation: Bankruptcy Act, 1896 (last amended in 2003) available on [www.iiglobal.org](http://www.iiglobal.org).

of the firm's assets. The administrator has wide-ranging power to void payments the firm makes up to four years prior to the beginning of the insolvency proceeding.

**Rights of creditors:** The new law expands the power of creditors to decide whether a company will liquidate or restructure. Secured creditors rank highest in the order of priority for distribution of liquidation proceeds. The court cannot cramdown any restructuring agreement between the firm and a group of creditors on dissenting creditors.

**Rights of debtors:** Shareholders, managers, and directors of the firm can face criminal or civil liability and restrictions on personal or professional activities. The new law is thus extremely punitive toward debtors if a court believes a firm's actions directly led to bankruptcy; they can be especially so if the interests of employees were affected.

**Spain:** The new Bankruptcy Act 22/2003 went into effect on September 1, 2004. Simultaneously, a new Insolvency Act was also promulgated to consolidate multiple laws that governed the rights of creditors and debtors.<sup>42</sup>

**Filing for bankruptcy encouraged:** Bankruptcy proceedings were consolidated into a single insolvency proceeding. The law created special courts (*Juzgados de lo Mercantil*) with expertise in dealing with matters related to commercial law. Creditors and debtors are encouraged to file for bankruptcy as soon as insolvency is anticipated. Creditors that file for bankruptcy are rewarded by treating a quarter of their credit as privileged credit. Directors of insolvent companies that fail to file for bankruptcy in a timely manner face severe liabilities and penalties. The new law thus reinforces the principle of *par condition creditorum*, the liability of bankrupt company's directors.

**Treatment of creditors in liquidation:** Classification of subordinate credits changed. Ordinary creditors receive priority over subordinate credit. Payments to privileged categories (such as employees) and payments to the treasury are limited, with the latter only receiving up to 50% of their debt. If specially related entities, such as relatives of firms' directors or intercompany loans, extend credit, these loans become subordinate and are paid only after all other creditors have been paid.

The new law emphasizes speed and efficiency of bankruptcy resolution. It does not encourage drawn-out restructuring efforts. It also severely limits subordinate creditors' ability to collect on their claims. By relegateing credit received from related companies, the new law protects the claims of existing creditors.

**Finland:** The Finnish bankruptcy Act (120/2004), Konkurssilaki passed in 2004 with the objective of providing clear guidance on the bankruptcy process for different types of debtors. It includes a public liquidation proceeding for cases where there are no assets. There are separate legislations to deal with liquidation and reorganization. These were not modified.<sup>43</sup>

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<sup>42</sup> Sources of information are Escolà, E., "New Bankruptcy Act in Spain: The Insolvent Companies are Obliged to File a Petition to be Adjudged a Voluntary Bankrupt," 2004. Available from iMakeNews website., and Bankruptcy Act No. 22, 2003 - *Ley Concursal No. 22, 2003* (in Spanish translated into English using Google Translate) and Organic Law on Insolvency Reform No. 8, 2003 - *Ley Orgánica para la Reforma Concursal No. 8, 2003* (in Spanish translated into English using Google Translate)

<sup>43</sup> Information was from the unofficial translation of the new law by the Finland Ministry of Justice and from the International Association of Insolvency Regulators.

Filing for bankruptcy: A debtor or a creditor can initiate a bankruptcy filing, with insolvency a prerequisite for declaring bankruptcy. The decision to open insolvency proceedings is announced in the Official Gazette. Upon acceptance of a filing, the court appoints an estate administrator or a liquidator, who takes over the assets of the firm and steers it through the bankruptcy process. The firm pays the administrator fees.

Rights of Creditors: Creditors who hold a claim against collateral can liquidate the collateral and collect on their claim from the proceeds if the estate administrator approves the sale of collateral. They are also allowed to form creditor committees to advise the estate administrator.

Rights of debtors: Debtors lose authority after a firm enters bankruptcy. The firm has to cooperate with the estate administrator; not doing so can lead to restrictions on the firm's management, including injunctions against leaving the country. The debtor shall not be released from liability for those debts in bankruptcy that are not repaid in full in the bankruptcy.

**Denmark:** Bankruptcies and restructurings (reorganisations) are governed by the Danish Bankruptcy Act, which provides for the following regimes: restructuring, bankruptcy, and rescheduling of debt. Denmark implemented a law in 2008 that made resolving insolvency easier by transferring some powers in bankruptcy proceedings from trustees to judges and granting more rights to creditors. Pursuant to the Danish Bankruptcy Act, a debtor is insolvent when it is unable to meet its liabilities as and when they fall due, unless such inability must be deemed temporary. The final decision is based on an assessment of the debtor's liquidity (a cash flow test). The fact that the debtor's liabilities exceed its assets is not generally of importance. Apart from the insolvency regimes available under the Danish Bankruptcy Act, an insolvent debtor may advance a proposal for a voluntary composition. Such composition constitutes an agreement between the debtor and the creditors comprised by the proposal and is governed by general rules of contract law.<sup>44</sup>

Following a rise in liquidations, Denmark passed a law that gave creditors significantly more control over reorganization proceedings. Prior to the reform, management approval was required for any reorganization plan to be legally binding; the role of creditors was limited to ratifying reorganization plans management proposed. In practice, creditors rarely approved management reorganization plans, and filing for reorganization is essentially just a precursor of liquidation (International Insolvency Institute n.d., Danish Bankruptcy Council 2009). After the reform, creditors gained the ability to file for reorganization and implement their own, court-enforced restructuring plans without requiring management consent. Management would then have to execute these plans and report to creditors through a court-appointed administrator. Creditors also gained the right to replace management and have the court-appointed supervisor/administrator oversee the firm's activities if necessary. Importantly, the

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<sup>44</sup> See: Bang-Pedersen, Ulrik Rammeskow (2017) "Danish Insolvency Law: Recent Developments and International Aspects." In Insolvency and Restructuring in Germany—Yearbook 2018, 12-19. Achern: Schultze & Braun.

new rules apply only to limited liability corporations; the reorganization rules for firms such as sole proprietorships remained unchanged (Bang-Pedersen, 2017).<sup>45</sup>

**Italy:** The Italian bankruptcy system was centered on the idea that failed businesses should be liquidated and insolvent debtors expelled from the economic system. As a result, the usual outcome of Italian insolvency proceedings was the liquidation of the debtor's assets, with pre-insolvency restructurings kept out of court and, therefore, outside a clear framework of legal protection. As a consequence, both debtors and creditors were exposed to clawback actions and criminal liability in the event of a debtor's subsequent bankruptcy.

In an effort to address these negative effects, the law governing Italian bankruptcy proceedings was substantially reformed. Italy enhanced its insolvency process in 2008 to give trustees greater discretion in liquidating assets; it also gave creditors the right to propose arrangements for other creditors to take over distressed assets, which may shorten the liquidation procedure. Through the reform, lawmakers introduced more efficient regulation of prebankruptcy procedures and debt-restructuring agreements. In particular, a principal goal of the reform was to support and facilitate company turnarounds and provide consensual prebankruptcy solutions for companies in financial crisis; this was to limit the high social costs associated with value destruction and reduce the risks arising out of “private” arrangements with creditors.

In Italy's bank-centric financial system, it is common for banks to hold 60% or more of the total claims against a debtor. Banks are therefore central players in debt restructuring proceedings in Italy. Prior to entering into an out-of-court agreement based upon a plan, creditors require that an expert accountant review the plan and issue an opinion on the reasonableness of the plan's assumptions, as well as the debtor's ability to fulfill its payment obligations. The expert opinion is intended to protect creditors against clawback actions based on the transactions, payments, and security interests made or granted pursuant to the plan and related agreements.

In particular, a debtor who carries out a restructuring under Article 182-bis is entitled to an automatic stay for 60 days following publication in the companies' register of the agreement that it has reached with its creditors representing 60% of the overall claims against the debtor, along with an expert's assessment. This protects the debtor during the negotiation phase. The automatic stay also prevents third parties from registering judicial mortgages and other preferential rights over the assets of the company unless it is consensual. In conclusion, this additional remedy gives debtors further incentive to adopt the new restructuring procedures.<sup>46</sup>

**Sweden:** The 2010 reform strengthened the Swedish secured transactions system through changes to the Rights of Priority Act. The Rights of Priority (Sw. *Förmånsrättslagen* (1970:979)) sets out a binding order of priority in the event of execution or bankruptcy but covers only some of the conflicts that may arise. The Act established the principle that all claims shall be paid pro rata in bankruptcy, but because certain claims have been right of priority, deviations from this fundamental principle of equal treatment occurred. The Rights of Priority Act has incurred several changes since it took effect in 1972. Changes in 2004, for

<sup>45</sup> See: Bang-Pedersen, Ulrik Rammeskow (2017) “Danish Insolvency Law: Recent Developments and International Aspects.” In *Insolvency and Restructuring in Germany—Yearbook 2018*, 12-19. Achern: Schultze & Braun.

<sup>46</sup> <https://webcache.googleusercontent.com/search?q=cache:jm5Dw4HKl0UJ:https://www.lexology.com/library/detail.aspx%3Fg%3D40b83e97-0831-4512-9d4f-d8bb855d4268+&cd=2&hl=en&ct=clnk&gl=us>

example, stated that only 55% of a company's personal property could be used as collateral security for credits. However, after concluding that this new form of "floating charges" led to worse credit opportunities for companies, the new 2010 regulation substantially reverted to the rules that applied before 2004. The advantages of the new regulation, among others, are: the business proprietor can fully use assets as collateral security for credit; property covered by the security right may be used fully as security while, at the same time, real property and securities may be pledged separately. Most important, the advantage for creditors is that a specific right of priority applies not only in bankruptcy, but also in levy of execution. Thus, the covered property cannot be object for levy of execution for any other claim. This new regime gives secured creditors' claims priority in cases of debtor default outside bankruptcy.<sup>47</sup>

**Germany:** On March 1, 2012, the Act for the Further Facilitation of the Restructuring of Companies (ESUG) came into effect. The main aim of the ESUG is to improve the prospects of an early and successful restructuring of distressed companies, to involve creditors in the selection process of the (preliminary) insolvency administrator, and to improve the reliability and predictability of particular insolvency plan proceedings.<sup>48</sup> The main changes of the ESUG to the current German insolvency law (InsO) include:

- Strengthening creditors' influence on insolvency proceedings;
- Binding proposals from the preliminary creditors' committee for appointing the insolvency administrator;
- Enabling debt-equity swaps as part of an insolvency plan proceeding; and
- Introducing preinsolvency restructuring proceeding (umbrella proceeding).

**France:** Historically, the French restructuring system has always been a debtor-friendly system. However, a certain shift began in 2014 regarding the various reforms to restore balance in creditors' rights.

The European Commission enacted a recommendation of a new approach to business failure and insolvency on March 12, 2014.<sup>49</sup> The commission's proposal extends the scope of Council Regulation number 1346/2000 promoting preventive procedures. The aim is to enable restructuring as soon as insolvency becomes likely, therefore maximizing the debtors' total value to creditors, employees, owners, and the economy as a whole. In parallel to the European Commission enacting this recommendation, on March 12, 2014, the French Government enacted a new regulation effective July 1, 2014, amending French bankruptcy law. It readjusted the balance of powers between creditors and debtors. This pro-creditor trend was confirmed by the *Loi Macron* dated August 6, 2015, with the introduction of a shareholder squeeze-out mechanism under which shareholders may be forced to sell their shares if they do not consent to share capital increases required to redress the distressed business in reorganization proceedings.<sup>50</sup> Key features are:

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<sup>47</sup> Further information can be found at:

<https://www.worldservicesgroup.com/publications.asp?action=article&artid=2849>

<sup>48</sup> <https://www.lexology.com/library/detail.aspx?g=68b4a709-c1fe-4aa5-9c6f-a448264b5921>

<sup>49</sup> <https://www.corporatelivewire.com/top-story.html?id=the-2014-reform-of-the-french-bankruptcy-insolvency-proceedings>

<sup>50</sup> This law is further examined at: <https://www.lexology.com/library/detail.aspx?g=eb113b52-cdfb-4b39-a549-4e6ee37484e2>

- Encouraging consensual pre-insolvency procedures (Conciliation and Ad Hoc Mandate) and the prepack sale practice covered by law.
- New stay and new money privileges in consensual pre-insolvency proceedings.
- Facilitated debt for equity swaps.
- Creditor rights in safeguard procedures, accelerated safeguard procedures, improved insolvency procedures regarding the set-up and agreement of a recovery plan, and new majority rules in creditors' committees.
- Debtor's shareholders meeting their duties with regard to debtors' recapitalisation needs.

In summary, on one hand there is still a priority for a recovery plan presented by debtors' shareholders, but on the other, shareholder duties and creditor powers are strengthened in order to ensure the viability and sustainability of the recovery plan.

**Mexico:** On January 13, 2014, several amendments to the Mexican Insolvency Law (*Ley de Concursos Mercantiles*) were enacted as part of a larger financial reform.

The main concerns the Insolvency Law addressed were:

- Limiting the rights of related parties of an insolvent entity to impose a reorganization agreement on other creditors. Pursuant to the amendments to the Insolvency Law, if the recognized claims of subordinated creditors of the company (including certain unsecured related party claims) represent 25% or more of total amount of all recognized claims, then such subordinated claims will not be taken into account for the voting requirements of a reorganization plan.

- Setting hard deadlines for the reorganization of an insolvent company. Pursuant to the amendments to the Insolvency Law, the mediation stage of the *concurso mercantil* procedure may not exceed a 185-day initial period, with two possible 90-day extensions; this period may not be extended as a result of a judicial resolution, as judges are now prohibited from extending any term set forth in the Insolvency Law. If a valid reorganization agreement has not been reached upon the conclusion of such periods, the insolvent entity will be declared bankrupt.

- Introducing a “prepack” proceeding that reduces the time to conclude an insolvency proceeding with a valid reorganization plan. Pursuant to the amendments to the Insolvency Law, an insolvent entity may file an insolvency petition with a pre-agreed reorganization plan, in which case the company may be declared insolvent by the court without an insolvency opinion from an inspector (*visitador*).

- Contemplating financing alternatives for the insolvent entity during the *concurso mercantil* stage. Pursuant to the amendments to the Insolvency Law, the concept of debtor-in-possession or “DIP” financing was introduced. Under this concept, creditors/lenders receive “super-priority” status in an insolvency proceeding to the extent that such financing: (a) has the prior authorization of the court or mediator (*conciliador*), and (b) does not contravene any resolution issued by the court or any authorization granted by the mediator.<sup>51</sup>

**Switzerland:** One of the main amendments to the Swiss Debt Enforcement and Bankruptcy Law in 2015 was the introduction of a proceeding like the Chapter 11 proceeding in the

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<sup>51</sup> More information can be found at: <https://www.corporatelivewire.com/top-story.html?id=testing-the-amendments-to-the-mexican-insolvency-law>

United States. The new procedure allows companies in troubled situations to benefit from a provisional moratorium of four months, under which claims against the company cannot be enforced. For stakeholders willing to support the stabilization of a troubled company and its subsequent potential going-concern, legal certainty is provided regarding agreements that are entered into by the company with its counterparties (e.g., creditors/lenders) within such controlled procedure. During the four-month period, the company can expand the final restructuring plan, and the reform allows creditors greater participation in the composition (reorganization) procedure. In addition to the “silent moratorium,” the new procedure sets forth the ability to terminate long-term agreements (e.g., lease agreements) if such a termination helps save a distressed company. It also allows only a new restructured company to take over a selection of employees, which is a promising and powerful option for many restructuring situations.<sup>52</sup>

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<sup>52</sup> For further information see: <https://www.corporatelivewire.com/top-story.html?id=pre-insolvency-restructurings-on-the-rise-in-switzerland>

**Table A6. Country-averages for dependent and independent variables**

Country	CDS NS	Creditor rights	Property rights	Shareholder rights	Total assets (\$bn)	Market-to-book	Leverage	Recovery rate	Jump risk
Belgium	-0.532	2	81.558	0	0.011	1.543	0.307	0.400	0.013
Brazil	-0.592	1	50.000	3	0.353	0.905	0.739	0.421	0.006
Canada	-0.247	1	90.000	5	0.032	1.609	0.280	0.447	0.009
Chile	-1.086	2	87.940	5	0.022	2.053	0.258	0.515	0.009
Denmark	-1.298	3	91.382	2	0.227	1.154	0.630	0.361	0.023
Finland	-0.906	1	90.488	3	0.020	1.458	0.298	0.458	0.012
France	-0.829	0	74.276	3	0.195	1.245	0.406	0.400	0.012
Germany	-0.668	3	90.000	1	0.248	1.136	0.458	0.411	0.012
Hong Kong	-1.103	4	90.000	5	0.044	1.283	0.295	0.415	0.012
Israel	-0.308	4	70.000	3	0.083	1.832	0.409	0.405	0.005
Italy	-1.003	2	53.512	1	0.194	1.071	0.561	0.424	0.012
Japan	-0.666	2	74.625	4	0.036	1.152	0.425	0.400	0.012
Mexico	-0.564	0	50.000	1	0.007	1.300	0.415	0.362	0.009
Netherlands	-0.771	2	90.000	2	0.089	1.351	0.313	0.394	0.011
Norway	-0.899	2	90.000	4	0.038	1.244	0.310	0.428	0.010
Philippines	-1.309	0	30.000	3	0.010	1.494	0.357	0.375	0.011
Portugal	-0.732	1	70.000	3	0.023	1.318	0.500	0.438	0.012
Singapore	-0.953	4	90.000	4	0.066	1.196	0.350	0.377	0.011
South Korea	-0.827	3	70.354	2	0.048	1.074	0.428	0.426	0.012
Spain	-1.097	2	70.000	4	0.236	1.198	0.506	0.474	0.012
Sweden	-1.037	2	90.465	3	0.100	1.530	0.393	0.373	0.012
Switzerland	-0.801	1	90.000	2	0.122	1.802	0.240	0.419	0.010
Turkey	-0.391	2	50.000	2	0.091	1.038	0.604	0.383	0.009
United Kingdom	-0.685	4	89.253	5	0.161	1.434	0.356	0.398	0.011
United States	-0.617	1	88.089	5	0.057	1.661	0.286	0.421	0.011

**Table A7: The DID analysis of pro-creditor rights reforms using alternative CDS price nonsynchronicity measures**

This table reports the results of CDS price nonsynchronicity (CDS-NS) regressed on an indicator for whether the CDS firm's country has adopted a bankruptcy law reform that strengthened creditor control rights by the month. Eleven countries adopted pro-creditor bankruptcy reforms during our sample period (please refer to Appendix for details of the reforms). We generate *CDS-NS* from statistical correlation measures:  $\rho = (p, s, k) = 24$ -month rolling (Pearson, Spearman, Kendall) correlation between CDS excess return for firm  $i$  in country  $j$  and the global CDS portfolio excess return (excluding firms located in the same country  $j$  of firm  $i$ ) ;  $\rho_{all} = (p_{all}, s_{all}, k_{all}) = 24$ -month rolling Pearson correlation between CDS excess return for firm  $i$  and the global CDS portfolio excess return (with all firms included). T-statistics are calculated from robust standard errors clustered by country-industry and are displayed in parentheses. Statistical significance at the 10, 5, 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

Model (5) table 7	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Alternative CDS-NS												
logit transformation:	1 - $p^2$	1 - $ p $	1 - $p_{all}^2$	1 - $ p_{all} $	1 - $s^2$	1 - $ s $	1 - $s_{all}^2$	1 - $ s_{all} $	1 - $k^2$	1 - $ k $	1 - $k_{all}^2$	1 - $ k_{all} $
<b>Pro-creditor rights</b>	-0.605*** (-3.641)	-0.431*** (-3.817)	-0.679*** (-3.672)	-0.491*** (-3.905)	-0.511*** (-3.251)	-0.334*** (-3.160)	-0.591*** (-3.606)	-0.388*** (-3.503)	-0.468*** (-3.211)	-0.283*** (-3.121)	-0.566*** (-3.758)	-0.343*** (-3.624)
<b>event</b>												
VIX	-0.178 (-0.636)	-0.121 (-0.605)	1.997*** (12.666)	1.391*** (13.908)	1.158*** (3.740)	0.915*** (4.655)	2.650*** (14.369)	1.854*** (16.169)	1.025*** (3.818)	0.707*** (4.396)	2.531*** (15.545)	1.605*** (16.770)
Total assets	0.086 (0.868)	0.052 (0.774)	0.032 (0.356)	0.026 (0.423)	0.115 (1.212)	0.074 (1.162)	0.110 (1.094)	0.075 (1.135)	0.090 (1.033)	0.055 (1.024)	0.123 (1.416)	0.075 (1.403)
Market-to-book	-0.025 (-0.551)	-0.019 (-0.607)	0.012 (0.235)	0.002 (0.056)	-0.058 (-1.264)	-0.040 (-1.322)	-0.012 (-0.252)	-0.012 (-0.375)	-0.061 (-1.417)	-0.037 (-1.418)	-0.006 (-0.144)	-0.006 (-0.231)
Leverage	0.738*** (4.321)	0.507*** (4.333)	0.874*** (4.534)	0.595*** (4.534)	0.637*** (3.869)	0.437*** (4.057)	0.692*** (3.801)	0.463*** (3.813)	0.557*** (3.713)	0.367*** (3.887)	0.611*** (3.730)	0.382*** (3.756)
Recovery value	0.176 (0.264)	0.125 (0.273)	-0.259 (-0.374)	-0.162 (-0.360)	-0.099 (-0.167)	-0.028 (-0.071)	-0.472 (-0.624)	-0.275 (-0.564)	-0.013 (-0.025)	0.015 (0.046)	-0.463 (-0.676)	-0.265 (-0.645)
Jump risk	-2.784*** (-3.358)	-1.939*** (-3.444)	-3.173*** (-3.433)	-2.262*** (-3.694)	-3.072*** (-3.606)	-1.966*** (-3.553)	-2.664*** (-2.811)	-1.747*** (-2.892)	-2.402*** (-3.083)	-1.460*** (-3.091)	-2.183** (-2.658)	-1.356** (-2.731)
GDP per capita	0.078*** (3.414)	0.054*** (3.437)	0.092*** (3.839)	0.065*** (3.928)	0.106*** (5.052)	0.069*** (5.053)	0.086*** (4.111)	0.059*** (4.237)	0.089*** (4.732)	0.054*** (4.662)	0.077*** (4.007)	0.048*** (4.060)
Stock Price	0.007 (0.289)	0.007 (0.421)	0.007 (0.229)	0.006 (0.304)	-0.014 (-0.586)	-0.006 (-0.414)	-0.001 (-0.033)	0.002 (0.092)	-0.013 (-0.548)	-0.006 (-0.434)	-0.000 (-0.011)	0.002 (0.100)
nonsynchronicity												
Amihud	0.056 (0.747)	0.050 (1.032)	0.043 (0.556)	0.038 (0.774)	0.224*** (4.789)	0.140*** (4.797)	0.136*** (2.761)	0.090*** (2.862)	0.203*** (4.502)	0.121*** (4.439)	0.117** (2.470)	0.073** (2.537)
Constant	-1.979* (-1.932)	-2.218*** (-3.163)	-3.006*** (-2.785)	-2.987*** (-4.036)	-2.825*** (-3.232)	-2.701*** (-4.697)	-2.456*** (-2.697)	-2.538*** (-4.202)	-1.290* (-1.653)	-1.440*** (-2.991)	-1.223 (-1.471)	-1.452*** (-2.823)
Year $\times$ Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	67915	67928	67919	67928	67897	67897	67892	67892	67550	67550	67584	67584
Adjusted R <sup>2</sup>	0.132	0.153	0.152	0.177	0.153	0.171	0.175	0.197	0.150	0.163	0.169	0.185

**Table A8. The DID analysis of pro-creditor rights reforms on CDS price nonsynchronicity for countries with more than five or ten CDS reference entities and with alternative standard errors clustering**

This table reports the results of CDS price nonsynchronicity regressed on an indicator for whether the CDS firm's country adopts bankruptcy law reforms that strengthen creditor-control rights by month. Eleven countries adopt pro-creditor bankruptcy reforms during our sample period (see appendix for details of the reforms). In column (1) and (2), we consider countries with at least five (or ten) CDS contracts written on different reference entities domiciled in those countries. We calculate *t*-statistics from robust standard errors clustered by country-industry; they are in parentheses. In column (3) to (5), we calculate *t*-statistics from robust standard errors clustered at industry-, firm-, and year-level, respectively. Statistical significance at the 10%, 5%, and 1% level is indicated by \*, \*\*, and \*\*\*, respectively.

	Dep. = CDS Price Nonsynchronicity				
	(1) Cut-off by five	(2) Cut-off by ten	(3) Cluster by industry	(4) Cluster by firm	(5) Cluster by year
<b>Pro-creditor rights event</b>	-0.302*** (-2.999)	-0.342*** (-2.891)	-0.278* (-1.753)	-0.278*** (-2.928)	-0.278** (-2.686)
VIX	-0.381** (-2.188)	-0.432** (-2.382)	-0.362* (-1.830)	-0.362*** (-3.251)	-0.362 (-0.412)
Total assets	-0.041 (-0.527)	-0.056 (-0.693)	-0.042 (-0.642)	-0.042 (-0.502)	-0.042 (-0.720)
Market-to-book	-0.057* (-1.849)	-0.072** (-2.212)	-0.060* (-1.927)	-0.060** (-2.169)	-0.060 (-1.600)
Leverage	0.407*** (3.888)	0.383*** (3.455)	0.407*** (3.048)	0.407*** (4.406)	0.407*** (3.389)
Recovery value	-0.462 (-0.883)	-0.543 (-0.971)	-0.440 (-0.648)	-0.440 (-1.110)	-0.440 (-1.138)
Jump risk	0.200 (0.410)	0.609 (1.282)	0.184 (0.351)	0.184 (0.414)	0.184 (0.297)
GDP per capita	0.063*** (4.624)	0.062*** (4.258)	0.066*** (3.740)	0.066*** (5.022)	0.066*** (5.007)
Stock price nonsynchronicity	0.010 (0.827)	0.019 (1.623)	0.010 (0.924)	0.010 (0.819)	0.010 (0.844)
Amihud	0.033 (0.308)	0.046 (0.454)	0.033 (0.296)	0.033 (0.325)	0.033 (0.406)
Constant	-1.246*** (-2.750)	-2.592*** (-4.003)	-2.867*** (-4.197)	-2.867*** (-5.169)	-2.867*** (-4.503)
N	66637	62722	67928	67928	67928
Adjusted R <sup>2</sup>	0.195	0.198	0.197	0.197	0.197